INDIA
RUBBER WORLD

A BILL BROTHERS PUBLICATION

MARCH, 1949

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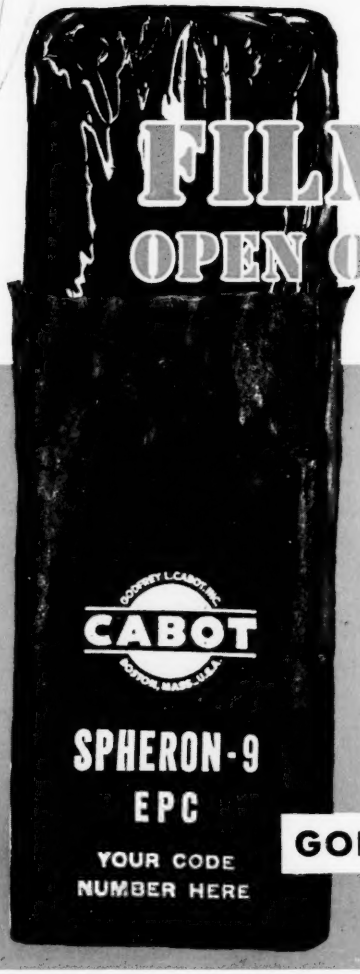

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NEOPRENE TYPE RT

A new, improved general-purpose polymer

RETAINS TACK LONGER

RESISTS VULCANIZATE CRYSTALLIZATION

STABILIZED WITH A NON-DISCOLORING ANTIOXIDANT

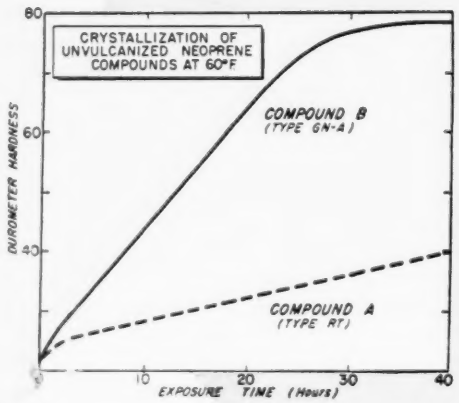

FIGURE 1

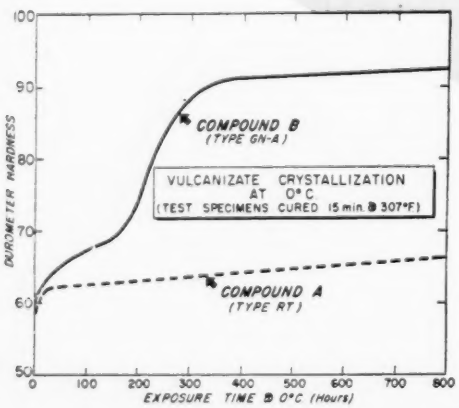

FIGURE 2

COMPOUNDERS will find Neoprene Type RT ideal for friction stocks where its improved tack retention assures excellent ply adhesion. And in roll covering, conveyor cover and sheet stocks, too, it will be found useful. Since Type RT stocks remain pliable, air-trapping during building operations is minimized in these applications.

The stiffening rates of similar Type GN-A and Type RT compounds are compared in Figure I. The retained softness of the Type RT stock correlates well with its improved retention of tack and flexibility.

Vulcanized Type RT stocks, too, resist stiffening even at 0° C.—the critical temperature for crystallization of neoprene. This is shown in Figure 2, which compares the resistance to stiffening of similar Type GN-A and Type RT vulcanizates at 0° C.

Because Type RT contains a non-discoloring antioxidant, it is stable in storage and may be used in stocks where minimum staining or discoloration is required.

Complete information on the use of Neoprene Type RT will be found in Report 49-2. Extra copies are available. Experimental samples on request. Write to:

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BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC Coast to Coast

INDIA RUBBER WORLD, March, 1949, Vol. 119, No. 6. Published Monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second-Class Matter at the Post Office at Orange Conn., under the act of March 3, 1879. Subscription United States and Mexico, $3.00 per year; Canada, $4.00. All Other Countries, $5.00; Single Copies 35 Cents. Address Mail to New York Office.

Porch Furniture by Bunting Glider Co., Philadelphia, Pa. *Cohyde Upholstery by Cotan Corp., Newark, N. J.*

THAT'S how the customers feel since the Bunting Glider Company upholstered its line of outdoor furniture with Cohyde containing Hycar. For this new plastic material has a long string of advantages porch sitters welcome.

Cohyde is a vinyl-type coated fabric in which Hycar, a nitrile type rubber, acts as the plasticizer. This new blend, besides producing a waterproof fabric that wears like elephant hide, won't crack or peel, and is actually resistant to flame. It is not injured by alcohol, acids, grease, oils or exposure to salt water. It never "bleeds" color onto your clothes and it never feels clammy, even in hot weather—thanks to Hycar!

What can Hycar do for you as a plasticizer or modifier for vinyls and other resins? This new development makes better products in many fields including upholstery, packaging, flooring, shoe, and paper.

If these uses for Hycar suggest an idea to you, or if you are interested in the many advantages this oil resistant rubber offers in the industrial field, let us know. You will find us eager to help. We make no finished products from Hycar but our technical service is always on hand to help you work out any special problems, or smooth the way for new applications. Write to B. F. Goodrich Chemical Company, Dept. HA-3, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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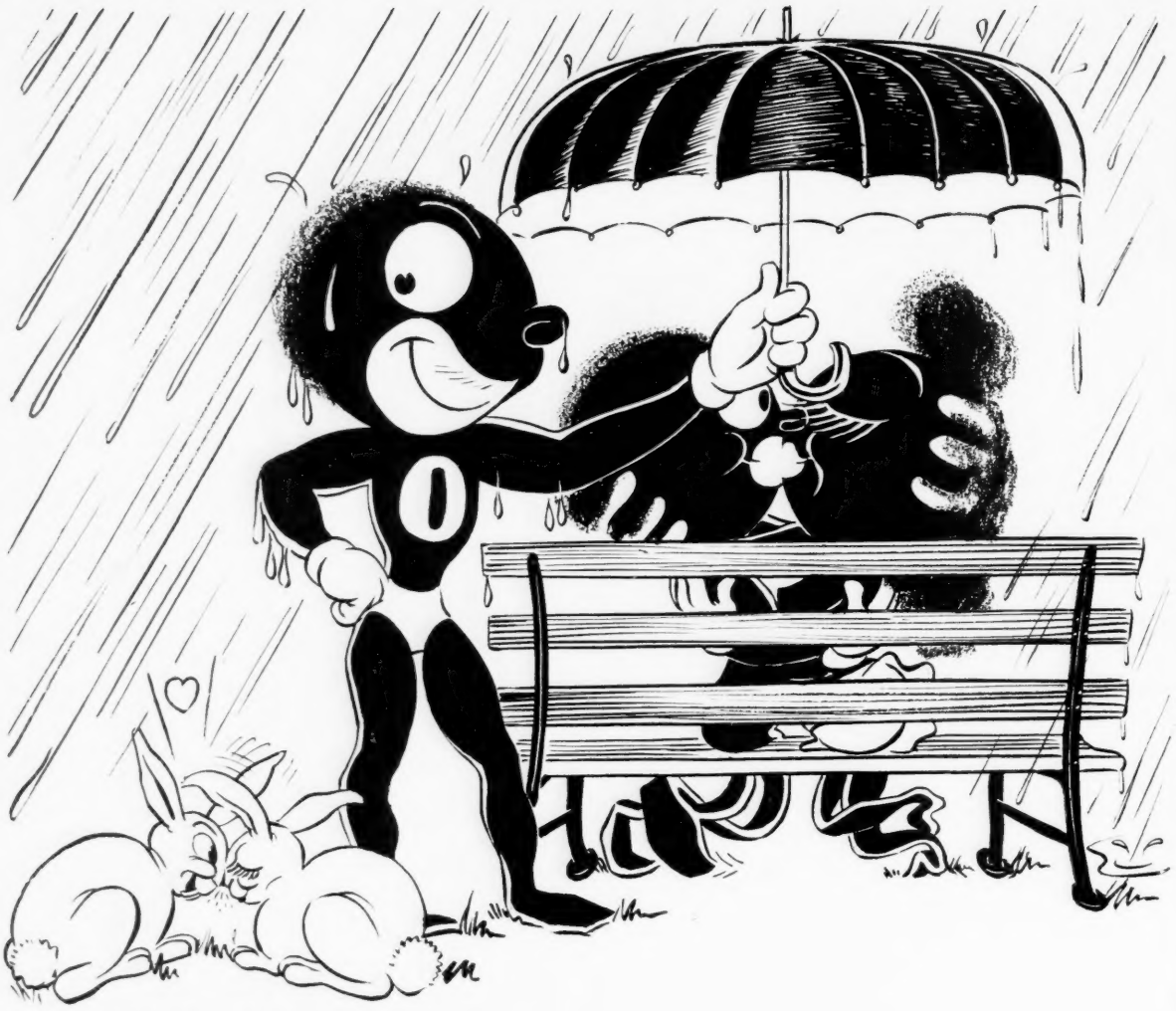

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Philblack O—*The HAF black that comes thru in a clinch—rain or shine!*

Philblack O has the happy faculty of satisfying manufacturers of rubber products! Three of the outstanding traits of this popular black are . . .

1. Exceptional ability to resist abrasion.
2. Unbelievably long flex life.
3. Excellent results when used in "cold" rubber products.

This high abrasion furnace black has unusually valuable characteristics in making various kinds of rubber products. Recent technical data is available, including new brochure "PHILBLACK O and PHILBLACK A in Natural and Synthetic Rubbers."

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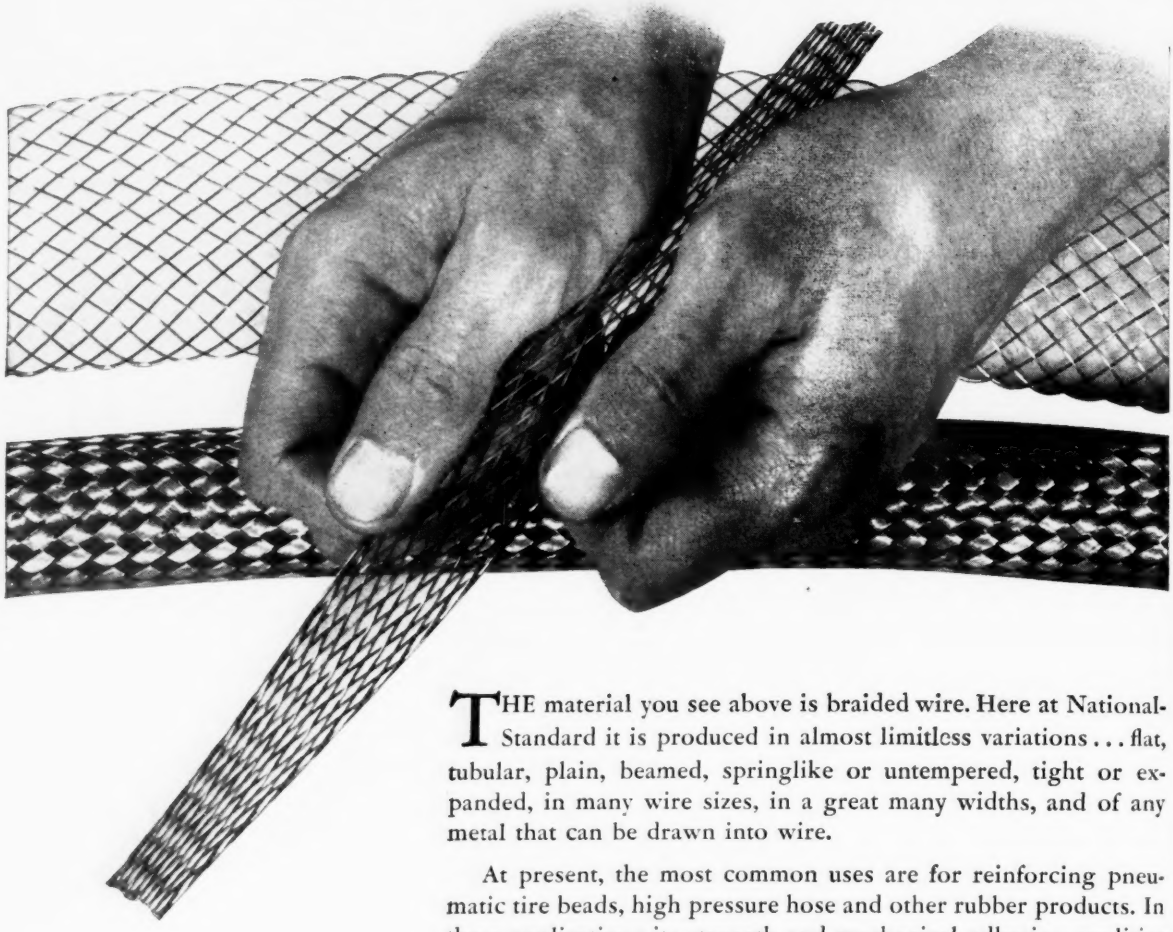

THE material you see above is braided wire. Here at National-Standard it is produced in almost limitless variations . . . flat, tubular, plain, beamed, springlike or untempered, tight or expanded, in many wire sizes, in a great many widths, and of any metal that can be drawn into wire.

At present, the most common uses are for reinforcing pneumatic tire beads, high pressure hose and other rubber products. In these applications its strength and mechanical adhesion qualities are unsurpassed.

Considering its limitless variations and unique qualities, braided wire is bound to have many other effective applications. Perhaps it can save or make money for you! An interesting possibility, for example, is its use with transparent plastics to produce pleasing patterns as well as reinforcement.

If all this gives you an idea you'd like to explore, be assured that National-Standard, as usual, is ready to cooperate with you all the way. Let's talk it over. Just get in touch with the *National-Standard Company, Niles, Michigan.*

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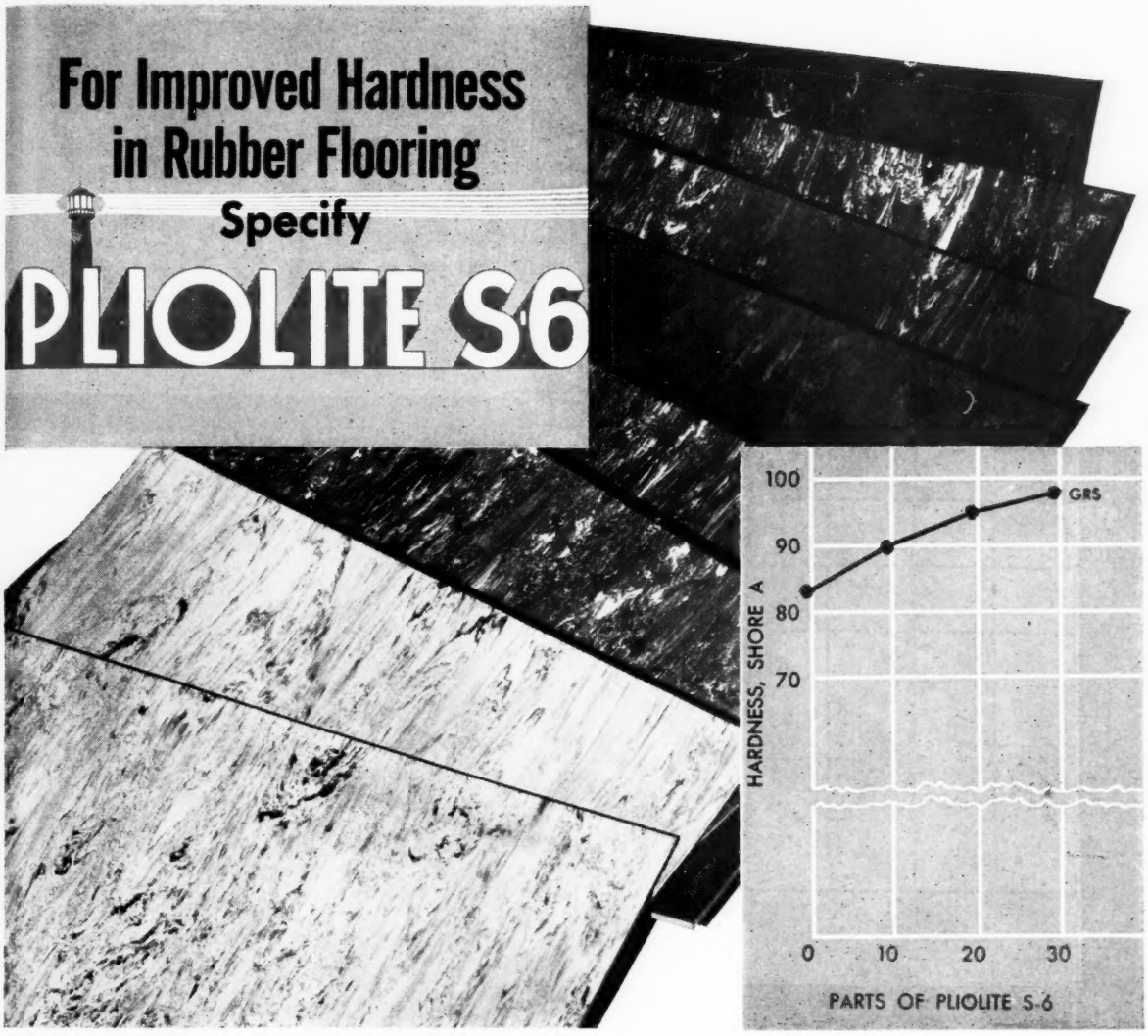

RUBBER flooring must be hard and scuff- and abrasive-resistant to withstand long years of abusive service. The chart above shows how effectively loaded GRS stocks are hardened by reinforcement with **PLIOLITE S-6**.

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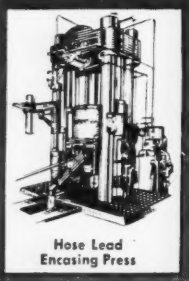
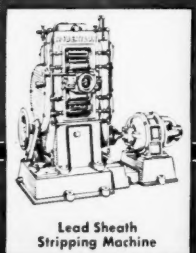
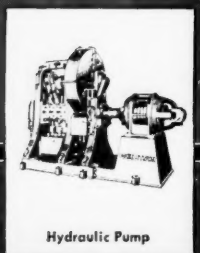


Hose Lead Encasing Press

Open Lead Melting Pot



Lead Sheath Stripping Machine



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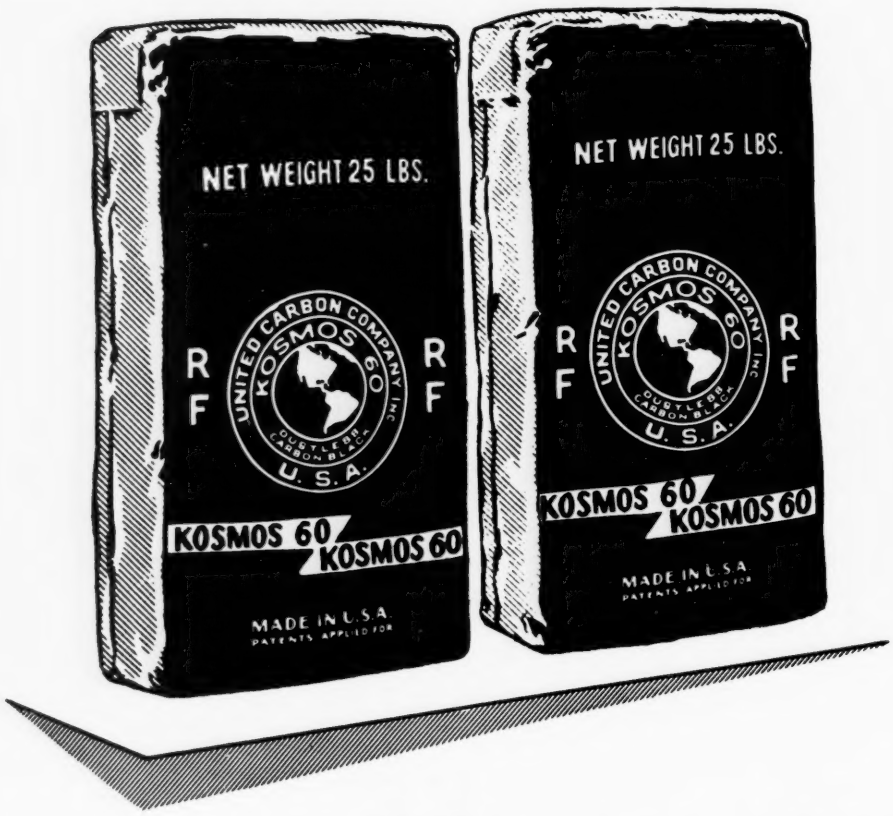

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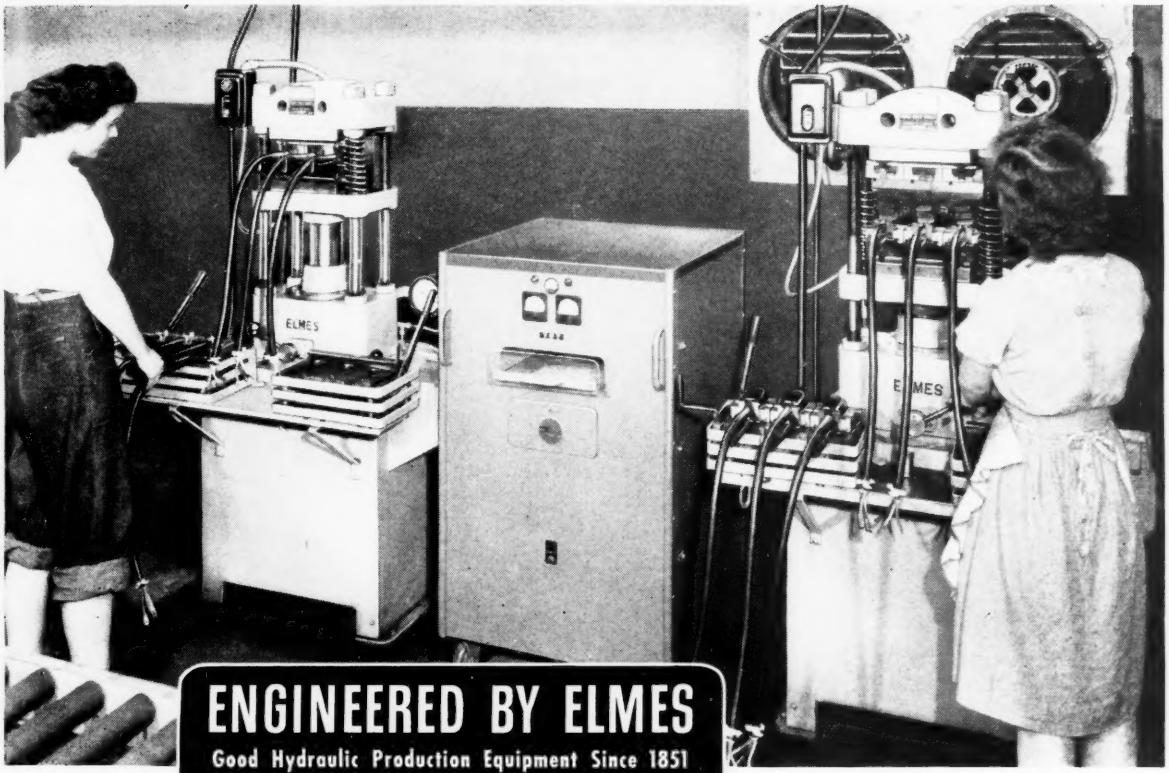

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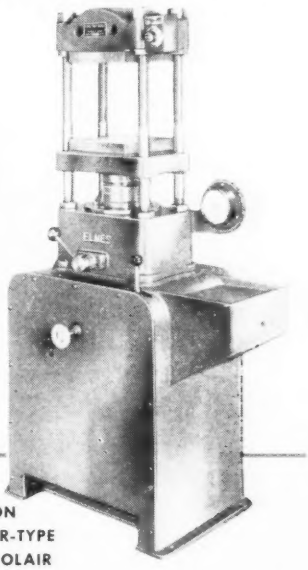

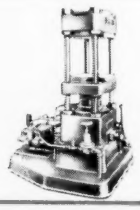

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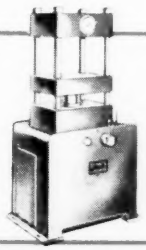

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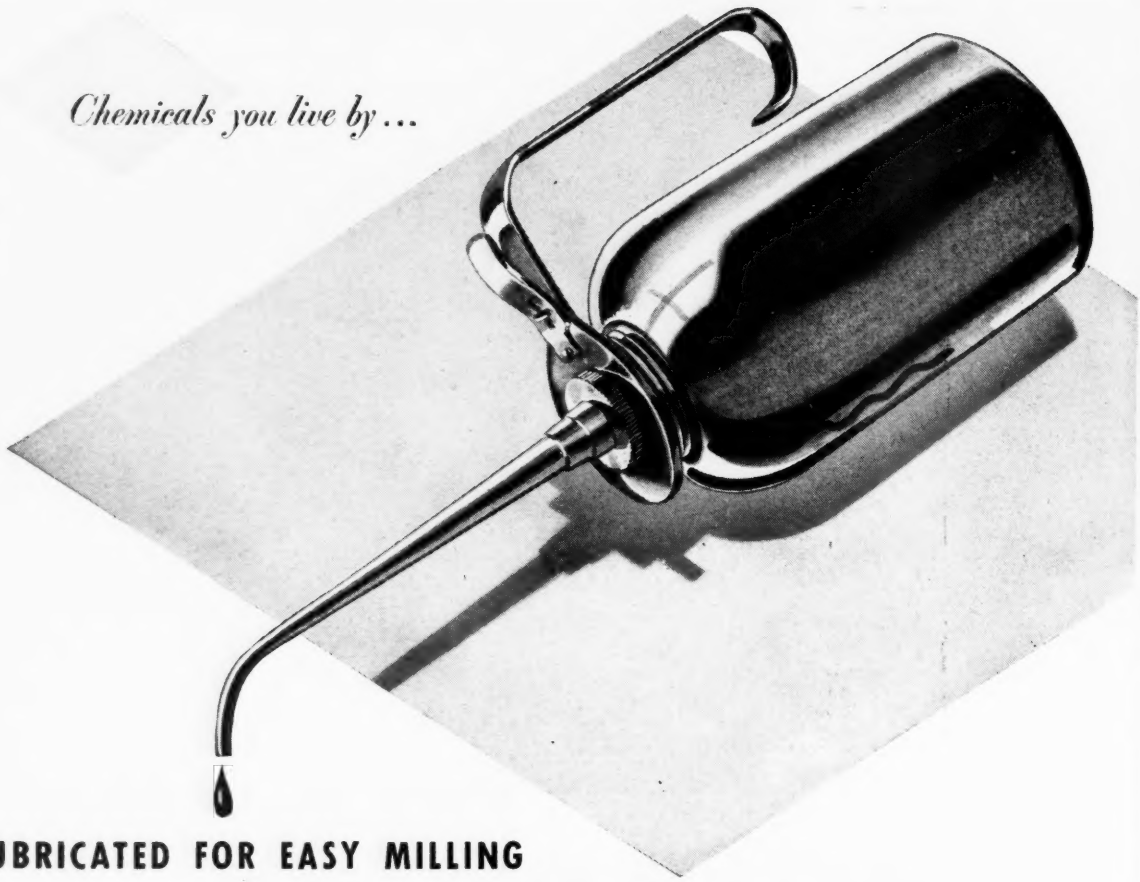

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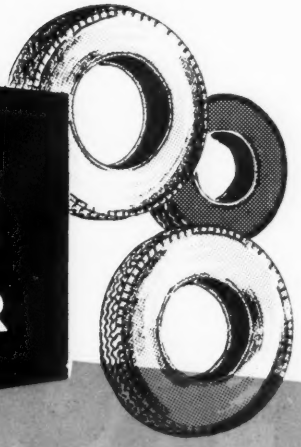

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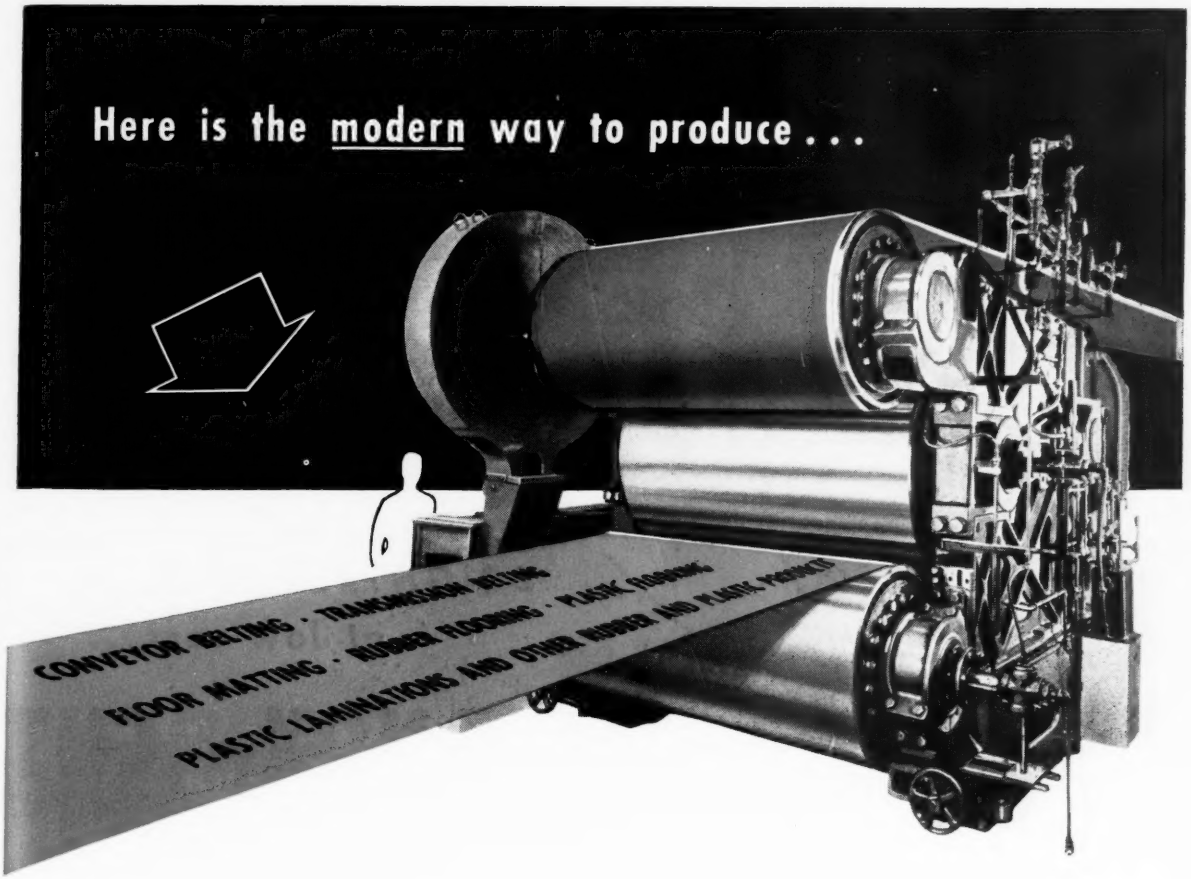
Here is the modern way to produce . . .


CONVEYOR BELTING · TRANSMISSION BELTING
FLOOR MATTING · RUBBER FLOORING · PLASTIC FLOORING
PLASTIC LAMINATIONS AND OTHER RUBBER AND PLASTIC PRODUCTS

This machine, the ROTOCURE,* has a number of advantages where the run of any one size or type of materials is great enough. For example:

1 Continuous operation increases production by eliminating interruptions for opening, unloading, loading and closing.

2 Where material is cured in long lengths, double-cure around the overlap area, necking and non-uniform stretch are avoided.

3 Less floor space is required.

4 The work area can be kept cleaner and free from water which is common in belt press pits.

Cost comparisons indicate that where manufacturing conditions favor the use of the ROTOCURE, this machine, on some products, can save up to nearly 50 per cent of present production costs.

A Farrel-Birmingham engineer will be glad to discuss with you the possibilities of the machine for your particular conditions. A request for an appointment, or for further details by mail, will involve no obligation.

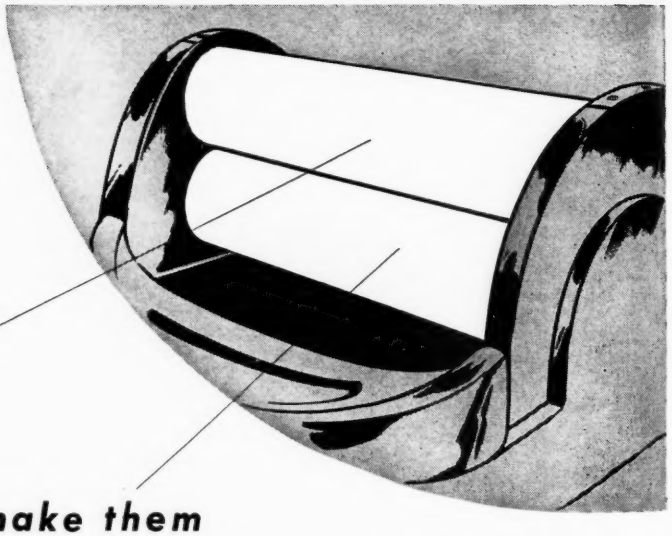
FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn.; Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

FB-508

* The ROTOCURE is a patented machine built under license from Boston Woven Hose & Rubber Co.

Farrel-Birmingham



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You can count on TITANOX-RCHT (rutile-calcium pigment) for high brightness because it possesses the maximum brightening power attainable in a composite pigment. Not only does this pigment brighten natural and synthetic rubbers, but it whitens them as well.

Manufacturers of wringer rolls find that balanced compounding to secure proper hardness, compression, and resilience in the roll naturally calls for TITANOX-RCHT, which also contributes brightness and whiteness economically.

There is a specific grade of TITANOX pigment that best meets your needs for whitening or tinting, brightening or opacifying your rubber stocks. Call on our Technical Service Laboratory to help solve any pigmentation problem. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities.

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TITANIUM PIGMENT CORPORATION

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"Head-plus-hand" Service Results in a Two-way Approach to your Adhesive Problems

What do you need . . . facilities for research . . . or highly specialized equipment for production?

Flintkote has both . . . at your service.

If you make a product that requires an adhesive with special characteristics . . . check into the Flintkote line. You'll find a versatile list of latex compounds, aqueous dispersions of rubbers and resins and solvent cements. You'll find products for bonding and laminating . . . as well as coating, saturating and sizing.

Chances are, you'll find just what you need. If not, our complete research facilities are at your disposal. We'll be glad to work with your staff, or independently, to develop *exactly* the product you require.

Flintkote's modern plants are ready to go to work for you with highly developed production facilities to assure delivery of *what* you need *when* you need it.

Take advantage of this heads-for-research, hands-for-production policy. Save yourself time, effort and trouble. We'll be glad to supply you . . . by the drum or by the tank car . . . with standard or special products. Write today outlining your requirements.

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You always get the **RIGHT** *grade for every use — from* **EMERY**!

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Vegetable FATTY ACIDS
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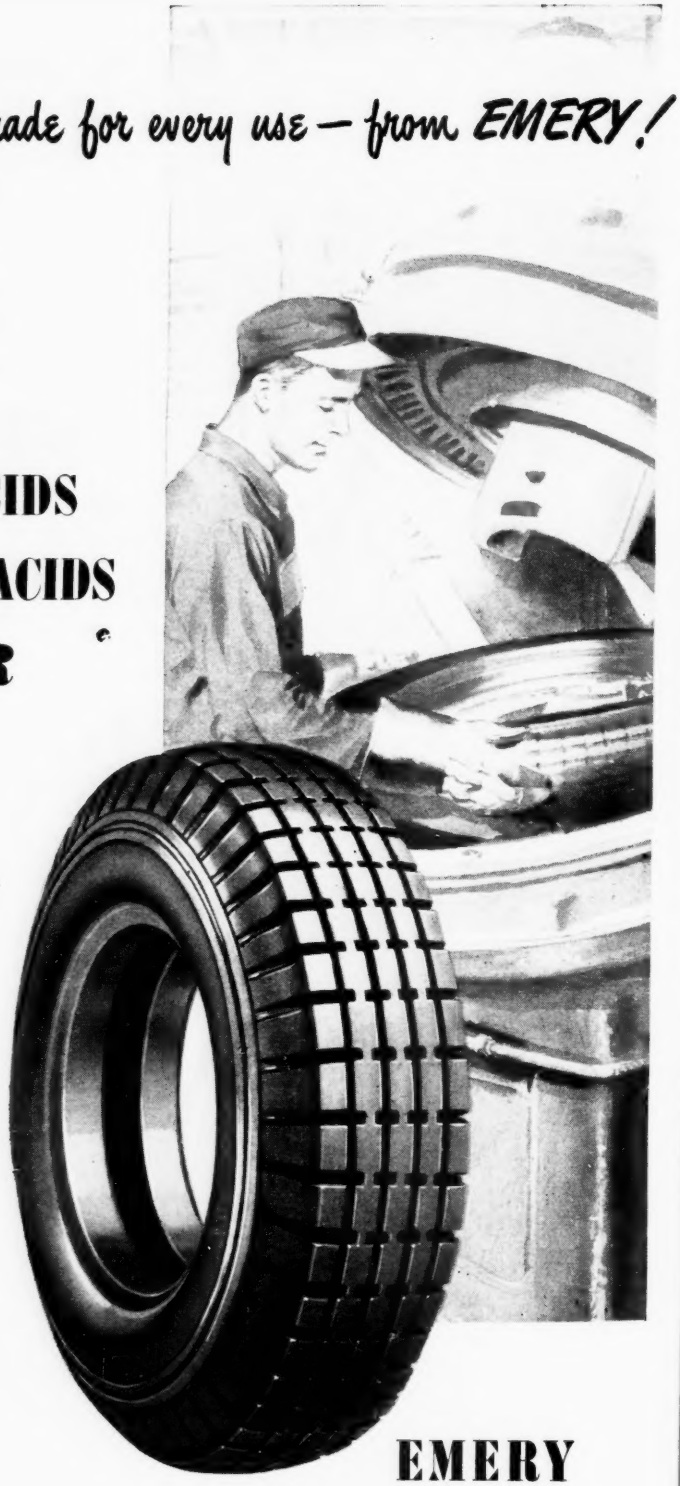
for RUBBER



STEARIC ACID . . . Quality controlled to meet industry specifications.

OLEIC ACID . . . All grades, high stability.

VEGETABLE FATTY ACIDS . . . Emery 600 Cottonseed and Emery 621 Coconut are typical examples of a range of fatty acids made from vegetable stocks.

HYDROGENATED FATTY ACIDS . . . Specification Grades.

FATTY ACID ESTERS . . . Emery 2210 Glyceryl monostearate, Emery 2410 diethylene glycol monostearate, Emery 2302 Propyl Oleate are representative of a group of fatty acid esters with high ester content and minimum free alcohol.

POLYGLYCOL ESTERS . . . Several of these are available in development quantities. Since type required depends upon use, specific information should be incorporated in your inquiry.

PLASTOLEIN PRODUCTS . . . Plasticizers for Synthetic Rubber, Vinyl resins. Specific data upon request. Address the Plastolein Dept. Our Sales Service Department is ready to supply complete specifications and use data.

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New ALBALITH-73 (LITHOPONE)

CUTS COSTS... IMPROVES QUALITY...

of Lithopone-Rubber Compounds

ALBALITH-73

- Mixes more quickly
- Aids tubing, calendering & spreading

—BECAUSE it's coated with fatty acids.

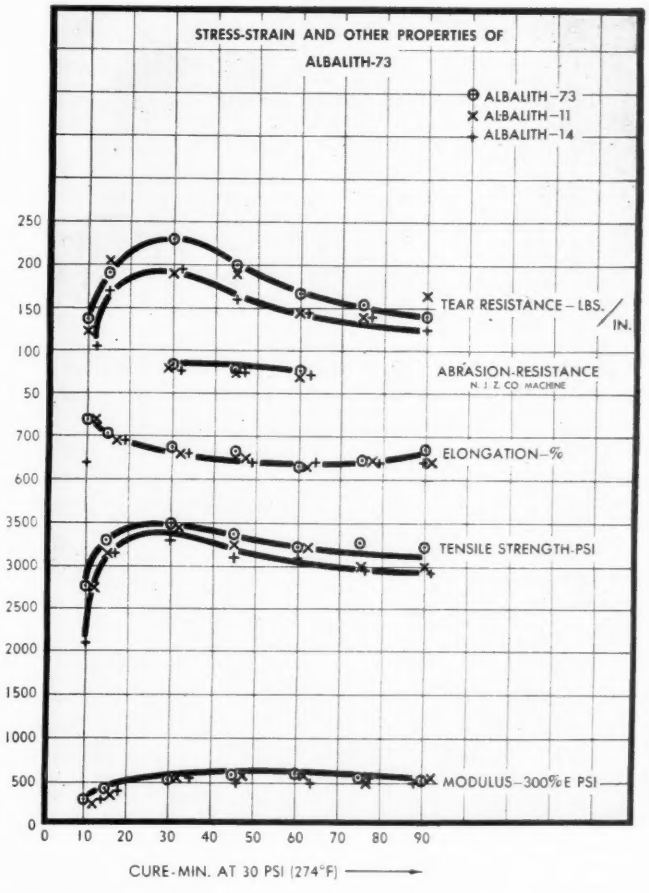
ALBALITH-73

- Provides higher tensiles
- Gives better tear resistance

—BECAUSE its better dispersion produces more interfacial area of contact with the rubber.

See the stress-strain comparison of Albalith-73 and two widely-used lithopones in chart at right.

YOU, too, can obtain improved reinforcement in YOUR lithopone stocks. Just make a direct substitution using Albalith-73. No accelerator-sulfur adjustment is necessary.



SEND FOR SAMPLES

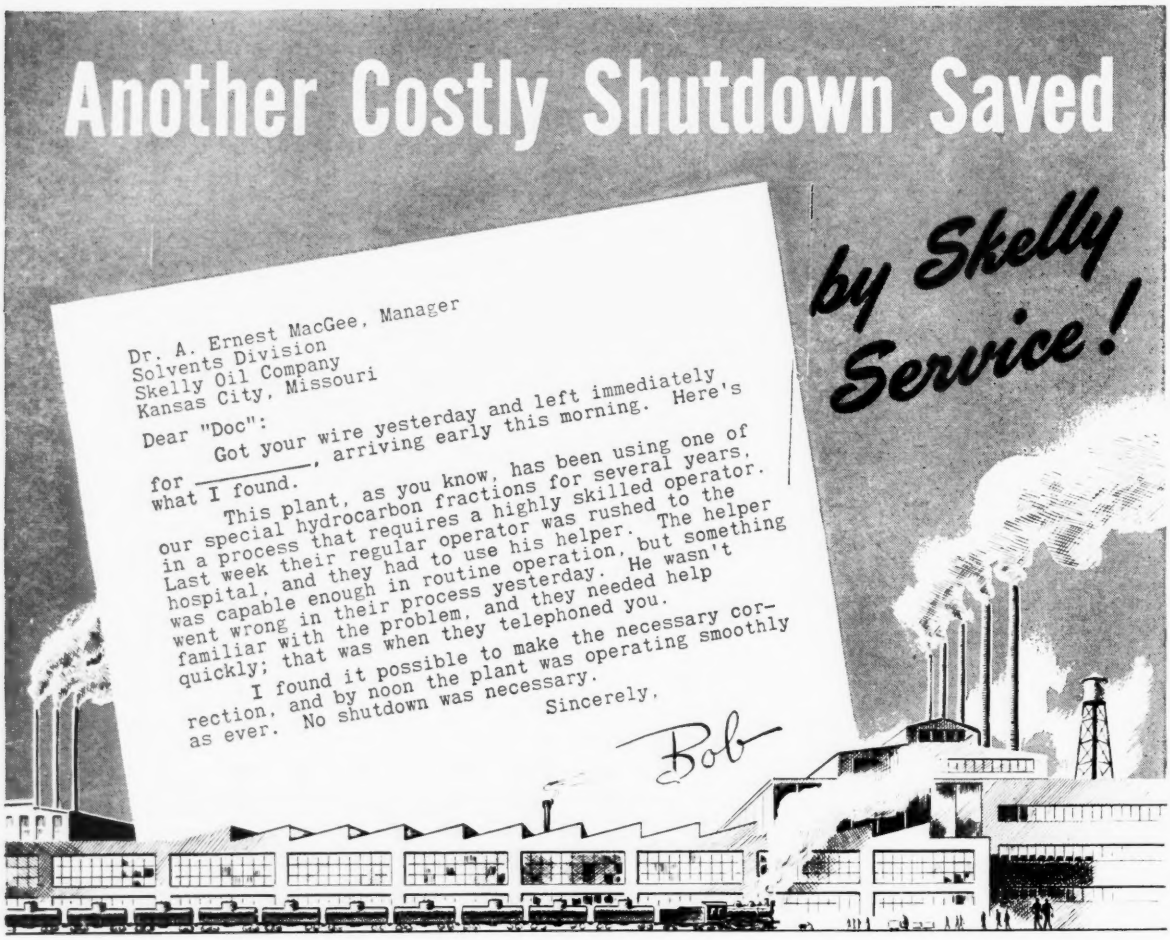
HORSE HEAD PRODUCTS

COMPOUND	
Smoked Sheet	100
Protox-166	5
Sulfur	3
MBT	1
Agerite Powder	1
Stearic Acid	3
Lithopone	70.4

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET • NEW YORK 7, N. Y.

Another Costly Shutdown Saved by Skelly Service!


Dr. A. Ernest MacGee, Manager
Solvents Division
Skelly Oil Company
Kansas City, Missouri
Dear "Doc":
Got your wire yesterday and left immediately for _____, arriving early this morning. Here's what I found.
This plant, as you know, has been using one of our special hydrocarbon fractions for several years, in a process that requires a highly skilled operator. Last week their regular operator was rushed to the hospital, and they had to use his helper. The helper was capable enough in routine operation, but something went wrong in their process yesterday. He wasn't familiar with the problem, and they needed help quickly; that was when they telephoned you.
I found it possible to make the necessary correction, and by noon the plant was operating smoothly as ever. No shutdown was necessary.
Sincerely,
Bob

"DOC" MacGEE SAYS: Every user of special industrial naphthas recognizes certain qualities as being highly important in the product supplied him. Purity, uniformity, and dependability are not only desirable, they are essential.

Sooner or later, every user realizes the importance of another factor — *ability of the supplier to render special service in emergencies!* When that occasion arises, the quick and effective action Skelly is famous for may mean a great deal to you. The emergency may call for rushing you a tank truck or drum shipment of solvent from our Chicago bulk plant to cover a sudden shortage. It may entail double-rushing a shipment or diverting a tank car in transit; or, it may require sending out a specially trained man to help correct a stubborn problem.

Whatever the circumstances, you can depend on our snapping into action to give you help when you need it. That's one more reason why so many firms have found it pays to do business with Skelly! Write today for complete information on Skellysolve service.

How SKELLYSOLVE Serves the RUBBER INDUSTRY

There are six different types of Skellysolve especially adapted to various uses in this industry, for making rubber cements and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. Our Skellysolve Technical Fieldmen have aided many manufacturers in developing formulas for new or improved products, and in "shooting" solvent troubles. Write today for full information.

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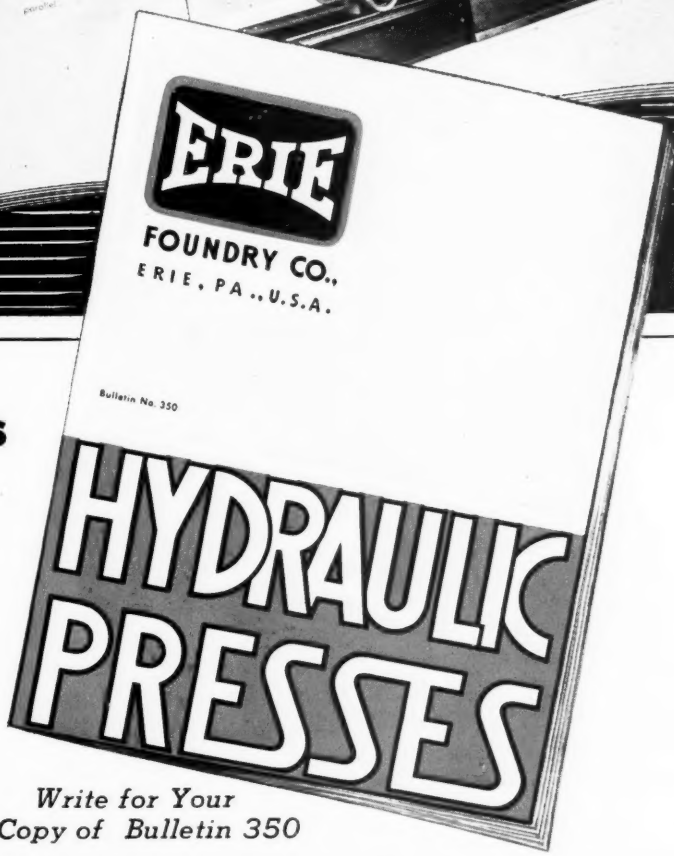
Die Hobbing Presses
Light Precision Molding
Presses for Diverse Applications



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A-C'S BUYING GUIDE TO . . .

GUARANTEED NEW AND REBUILT INDUSTRIAL ELECTRICAL EQUIPMENT

AUTHORIZED A-C DEALER

MOTOR GENERATOR SETS (Reconditioned and Guaranteed)

Qu	KW	D.C. Volts	Make	A.C. Volts
7	2	125v	E.M.	220/440/3/60
5	3	250v	Reliance	220/440/3/60
2	7½S	Drives	Reliance	220/440/3/60
5	5	250v	Reliance	220/440/3/60
2	7½S	Drives	Reliance	220/440/3/60
5	10VS	Drives	Reliance	220/440/3/60
1	15	125v	Bogue	220/440/3/60
4	15	250v	G.E.	220/440/3/60
7	20	250v	G.E.	220/440/3/60
1	30	115v	Whse	220/440/3/60 Sq. Cg.
1	30	250v	G.E.	220/440/3/60 Sq. Cg.
2	40VS	Drives	Reliance	220/440/3/60
2	50	250v	C-W	220/440/3/60 Sq. Cg.
1	60	125 or 250	Whse	440/3/60 (New-syn)
2	60	250v	C-W	220/440/3/60 Sq. Cg.
3	75	250v	C-W	220/440/3/60 Sq. Cg.
1	75	250v	Whse	220/440/3/60 Sq. Cg.
1	100	125v	A-C	4160/3/60 80% Syn.
1	100	125/250v	A-C	Any/3/60
1	100	250v	C-W	Any/3/60 Syn 100%
1	150	250/275v	G.E.	220/3/60 Sq. Cg.
1	170	125v	G.E.	2200/3/60 Sq. Cg.

D. C. CONSTANT SPEED MOTORS, 230 volts (Reconditioned and guaranteed except where shown "New")

1	2	1752	Master	224 (New)
12	3	850/1700	Rel.	23T
5	5	820/1535	G.E.	CD93
1	7½	800/1200	Elec.	55
1	7½	850/1700	West	SK63
1	25	1150	West	SW103

CONTROLS (new) A. C.

Qu	Size	Mfg.	Volts	Type
12	1	C-H	220-440-550	Combination
25	2	C-H	220-440-550	Combination
14	3	Clark	440-550	Combination
3	4	C-H	440	Combination
14	2	C-H	220-440	Reversing
2	3	Sq. D	440	Reversing
3	4	C-H	440	Reversing
2	5	C-H	440	A-C-L 200 HP

CONTROLS (new) D. C.

Qu.	Size	HP	Mfg.	Volts	Type
30	1	3	G.E.	115 or 230	CR 5230
3	1	5	C-H	230	Adj. Speed
4	2	10	A.C.	230	Contact Speed
3	2	10	A.C.	230	Adj. Speed
2	3	10	C-H	230	Adj. Speed—Rev.
2	3	25	C-H	230	Adj. Speed
1	3	25	C-H	230	Adj. Speed—Rev.
1	4	40	C-H	230	Adj. Speed
1	4	40	C-H	230	Adj. Speed—Rev.
2	5	75	C-H	230	Adj. Speed
1	6	150	C-H	230	Adj. Speed

SLIP RING AND SYNCHRONOUS MOTORS

Qu.	Hp.	RPM	Make	Description
1	250	600	Lincoln	220 v 1XY, slip ring R & G
1	100KW	1200	Elec. Mach	Syn Gen 80% PF, single brg. R & G
1	50	900	Louis Allis	SR. with automatic controls R & G
1	150	1200	Al. Chal.	440 v. YS26ES SR
1	125	1200	Al. Chal.	440 v. S26D SR
1	60	1200	Al. Chal.	505 SR
1	50	1200	Al. Chal.	505 SR
1	25	900	Al. Chal.	444 SR

A. C. SQUIRREL CAGE MOTORS, 220/440 v., 3 ph., 60 cy. (New except where shown as R&G)

Qu.	HP	RPM	Make	Description
1	200	1200	Al. Chal.	
1	150	1800	Al. Chal.	R&G
1	150	1200	Gen. Elec.	
1	150	900	Al. Chal.	
1	125	1800	Al. Chal.	
1	125	1200	Al. Chal.	
1	125	900	Al. Chal.	
1	100	1800	Al. Chal.	
1	100	1200	Louis Allis	
1	100	900	Al. Chal.	
1	100	1200	Al. Chal.	XP
1	100	900	Al. Chal.	TEFC
1	100	900	Al. Chal.	XP
1	75	1800	Al. Chal.	
2	75	1200	Al. Chal.	
1	75	900	Al. Chal.	
1	75	900	Al. Chal.	TEFC
1	60	1800	Al. Chal.	
1	60	1200	Al. Chal.	
1	50	1200	Reliance	
1	50	3450	Ideal	R&G

Complete stock of motors, speeds 900 to 1800 RPM, in ratings below 50 HP.

REDUCED VOLTAGE STARTERS

Qu.	H.P.	Mfg.	Volts	Type
10	15	C-H-G.E.	220-440	R&G
6	25	C-H	220	Primary Resistor-New
9	50	C-H	220-440	New and R & G
4	75	C-H	220	New
3	100	C-H	440	New
4	125	C-H	220	New
1	150	C-H	440	New
2	125	C-H	440	Primary Resistor—New

D. C. ADJUSTABLE SPEED MOTORS 230 VOLTS (Reconditioned & Guaranteed)

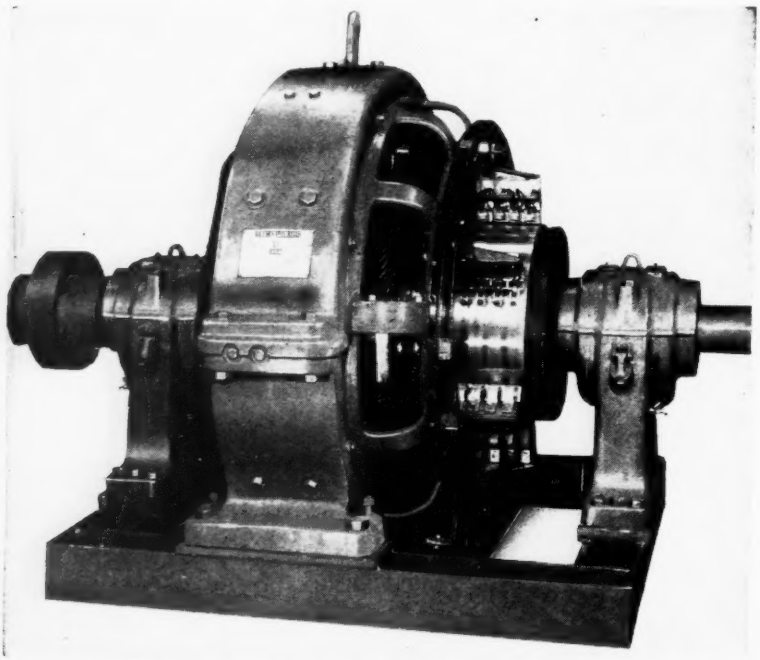
3	3/5	1150/2850	Rel.	41T (New)
3	3/5	1150/3450	G.E.	284
1	3/5	450/1800	G.E.	CD-75
1	5/7½	500/2000	L.A.	ONW-851
2	7½/10	400/1600	G.E.	CD-85
2	7½/10	450/1800	Rel.	92T
2	7½/10	600/1800	Rel.	66T
1	10/15	400/1600	G.E.	CD-95
1	10/15	575/1725	L.A.	ONA-995
5	10/15	575/2300	G.E.	CD-85
3	10/15	400/1350	Marble Card	
5	15/20	400/1200	G.E.	CD-105
1	20/25	400/1200	Electro Dyn.	208
1	25/30	400/1600	Rel.	262T (New)
3	40/50	250/1500	G.E.	CD1441
1	40/50	350/1050	West.	SK141
2	40/50	400/1500	Rel.	385T
1	50/60	300/900	Electro Dyn.	308
1	125/150	262/750	G.E.	MPC
1	135/175	450/1200	G.E.	MCF
1	200	300/900	West.	

MISCELLANEOUS

1. Falk Steelflex Couplings, Sizes 3F to 18F, available for stock delivery.
2. New P & H Harnischfeger Zip Lift Hoists in stock, 250 to 2000 pound lift, 320, 440 or 550 volt motors.
3. New Robbins & Myers 5000 lb. Type S 3 BG Hoist, complete with hand geared trolley and totally enclosed motor, lifting speed 32 FPM, pendant rope control.
4. Chandesson 5000 amp., 6 volt plating generator set with complete control, synchronous motor drive, 440-3-60.
5. 60 KW, 1500 amp., Anodizing M-G Set, 3/40 volts, any A.C. voltage, 3 ph, 60 cy. squirrel cage drive.
6. Electro-Products 120 KW, 3000 amp. Anodizing M-G Set, 3/40 volts with complete control and synchronous motor drive.

VARIABLE VOLTAGE CALENDER DRIVES

1 125KW 250v Whse. 200 HP 1160 RPM 2200/3/60 Complete with Exciter, all AC control and 100p circuit controller.
200HP 300/900RPM 250v DC Shunt Wound Motor.
1 150KW 250v DC G.E. 250HP 900 RPM 220/3/60 Complete with exciter, all AC control and loop circuit controller 135/175HP 450/1050 RPM Shunt Wound Motor.



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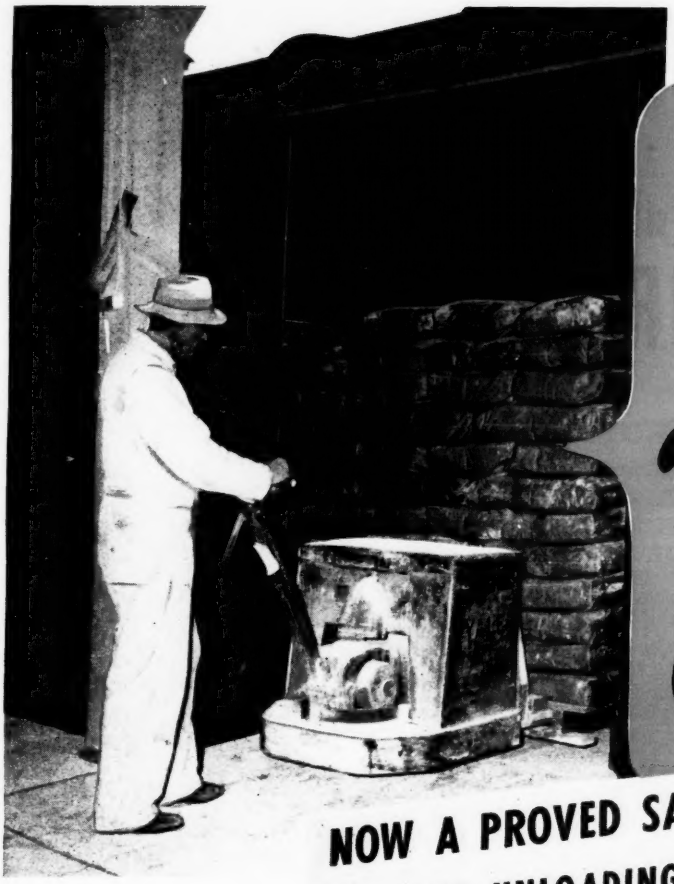

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- CUTS UNLOADING COSTS and TIME . . .
- SIMPLIFIES SUBSEQUENT HANDLING . . .
- MINIMIZES BAG BREAKAGE . . .
- REDUCES INVENTORY COUNTS . . .
- PERMITS USE OF STANDARD FORK TRUCK EQUIPMENT . . .

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Since CHAMPION pioneered the idea of shipping clay on EXPENDABLE PALLETS a few months ago more than 150 car loads have been delivered to prove the value of this innovation in clay handling . . . Truly this idea assures real economy in the delivery of the fine, uniform light-colored clay that is mined and processed with extra care by the National Kaolin Products Company at Aiken, South Carolina.

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BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

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when cut on the new

NRM TREAD SKIVER

WHY *recut* your tread sections! With the new NRM Tread Skiver you get *precision* cutting—with less than ⅛ of an inch variation in length of tread sections.

The big 20″ blade cuts smoothly, precisely, on the fly *in one direction only.* This clean, steep-angle cut of each skive assures perfect matching and a greater surface for vulcanizing, and can be varied in pitch from 15° to 45°.

The cutter carriage starts slowly as the blade cuts through the thinner section of the tread, gathers speed through the thicker center, then diminishes speed again at the other thinner edge.

For a complete technical description of the new NRM Model 46 Tread Skivers for 24″ or 36″ belt width and records of performance in actual production, write to us today.

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General Offices: AKRON 8, OHIO

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Calcene® T

with thermal blacks

Trade journal market prices of pigments are, of necessity, f.o.b. listings. On this basis, there may be little difference in the price of Calcene T and various thermal blacks. When *delivered prices* are compared, however, substantial savings frequently can be realized through the use of the white pigment, Calcene T.

In some cases, especially molded goods, a direct substitution of Calcene T can be made. In others, compound changes are required to attain desired results, but the work involved may be justified by the savings. In addition, the use of Calcene T enables the compounder to produce goods of any color desired.

SEND FOR COMPARISON DATA showing costs of Calcene T and typical thermal blacks on f.o.b. and delivered prices. Comparisons of physical properties obtained through the use of Calcene T and thermal blacks in various compounds are also included. Write for Columbia Pigments Data Sheet No. 49-1. Address your request to Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pa.

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GLYCERINE *High Gravity and Crude 88%*

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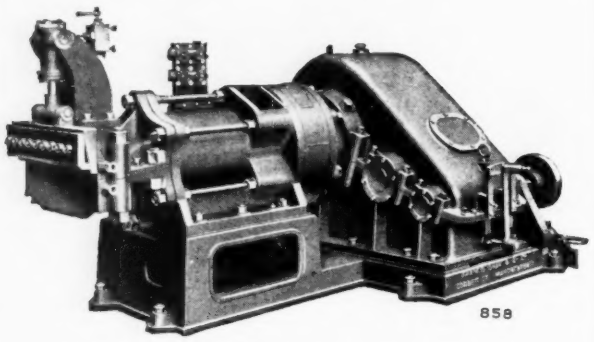
SHAW RUBBER EXTRUDERS



An 8-inch Shaw Extruder
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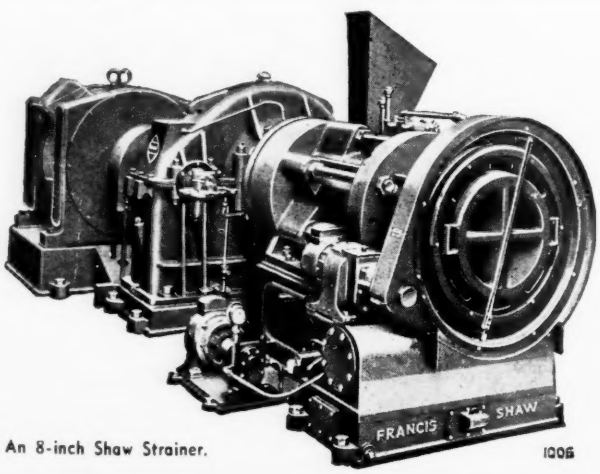

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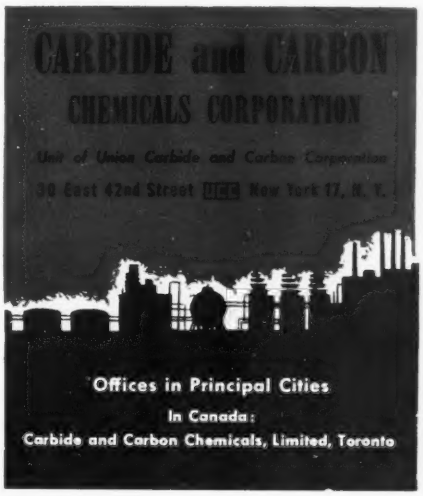
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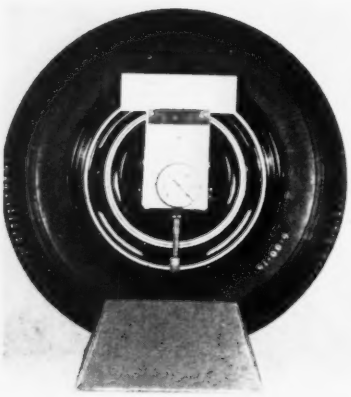

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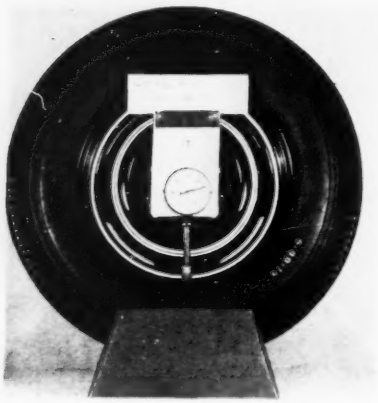

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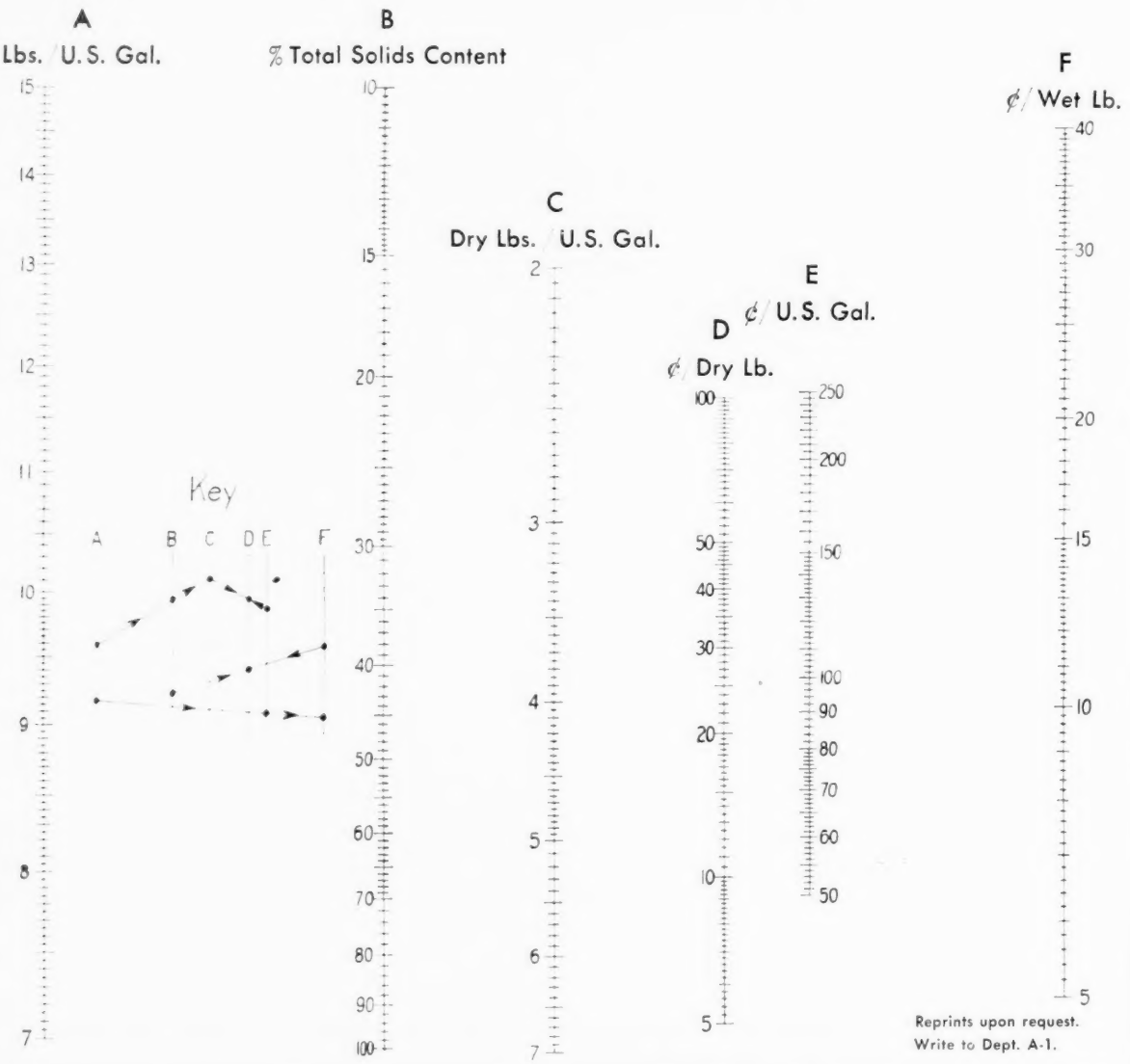

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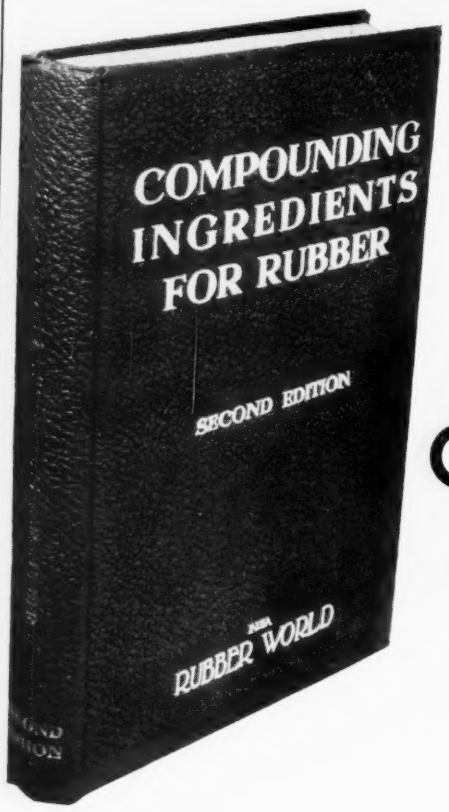

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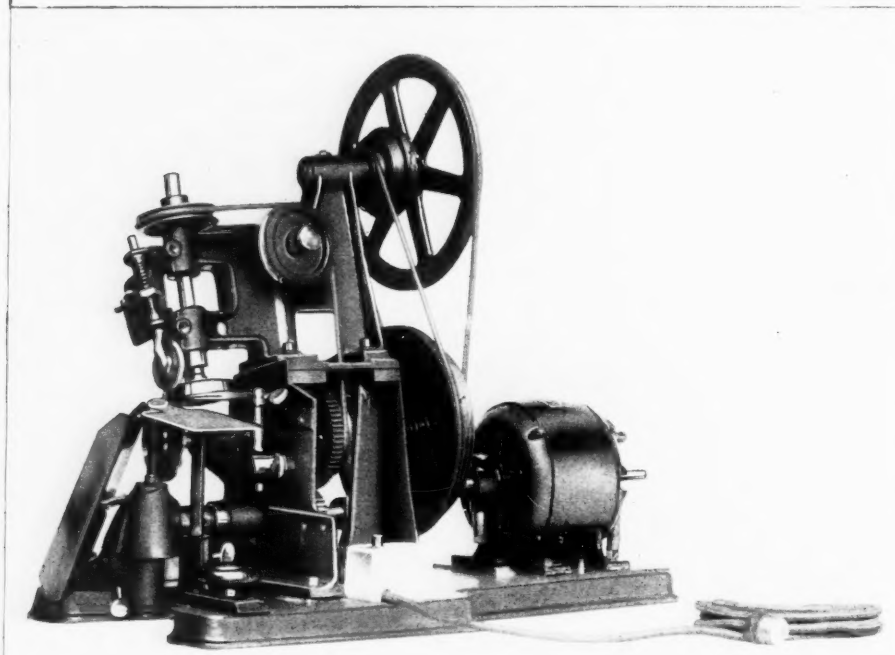

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Photo-Elastic Applications in Rubber Technology—I[1]

James A. Hurry[2]
and Douglas Chalmers[2]

WE BELIEVE this paper will be of interest both to rubber product design engineers and to rubber product compounders. Both groups were represented in its preparation. To the rubber product engineer it suggests a brief, practical, quantitative method for determining the probability that his design will withstand the forces to which the product will be subjected in service. To the compounder who has frequently wondered how certain formula specifications are derived, it represents a much needed step preceding laboratory and service testing in order to insure that stock requirements are realistically established.

Photo-Elastic Analysis and Product Design

Photo-elastic analysis holds particular promise in rubber product design. The technique will be described using suitable low modulus model material. There are illustrated qualitative applications upon sections of models of rubber molded products and test specimens. The technique is applied to a typical processing problem encountered in the rubber industry. A brief extension of the method to quantitative analysis will be presented with reference to the physical and photo-elastic constants of the material used. The effect of the non-linear stress-strain condition will be included.

The General Problem of Product Design

Product design, expressed simply, is the distribution and profiling of selected structural materials in order that they will best withstand service requirements. These requirements may be related to simple tension, compression, and shear stresses. They may be more complex, such as encountered in torsion and bending which are made up of combinations of tension, compression, and shear.

The force reactions which products must undergo may be further complicated by time and frequency factors. High force magnitudes in short times of application represent "shock" or "impact" problems. More moderate forces applied over a long-time period introduce "creep" or "flow" phenomena. These represent permanent deformation because of the plastic phase found to some degree in all materials. Forces may be applied in cycles over a wide range of frequencies. Such cyclic forces may be in directions causing flexing in tension, compression, shear, torsion, simple bending, and combinations of these.

Structural materials of substantially rigid nature have been found to obey such predictable relations as Hooke's Law over a measurable range of their ultimate strength in any direction. This simply says that any force (stress) produces a proportional deformation (strain).

A measurable physical relation like this, coupled with the tools of mathematics such as graphical analysis, analytical geometry, trigonometry, and the calculus, make reasonably practical the "drawing board" design of rigid materials into immediately successful products and structures. Many phases of mechanical, civil, and electrical engineering lend themselves to such a high degree of technical control of design.

It is also a frequently encountered principle of dynamic design that maximum life is associated with cyclic stresses at the lowest possible percentage of rupture stress. This is the so-called "stress-minima" criterion of optimum design for longest dynamic life. Effective design, therefore, entails not only selecting materials of known ultimate strength, but with a knowledge of the ratio of actual service stress to ultimate strength.

Design Limitations in Rubber Technology

The rubber product design engineer too frequently finds that the generalized equations of the basic engineering sciences do not adequately cover the conditions and variables encountered in his problem. Rubber-like materials show non-linear relation of stress and strain. This non-linear relation would be no great design problem if it were constant or even practicably controllable. Generalized expressions could then define it. Unfortunately the non-linear condition is not only greatly affected by material composition and method of preparation, but also by time and temperature of testing or service. Rubber-like materials further display considerably higher degrees of strain per unit stress than are encountered with usual engineering materials. Those relations the rubber product designer does find and measure are

[1] Presented before the Division of Rubber Chemistry, A. C. S., Los Angeles, Calif., July 22, 1948.
[2] Gates Rubber Co., Denver, Colo.

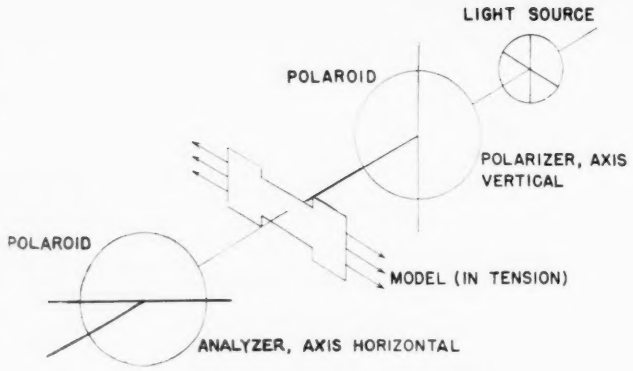


Fig. 1. Schematic Plane Polariscope

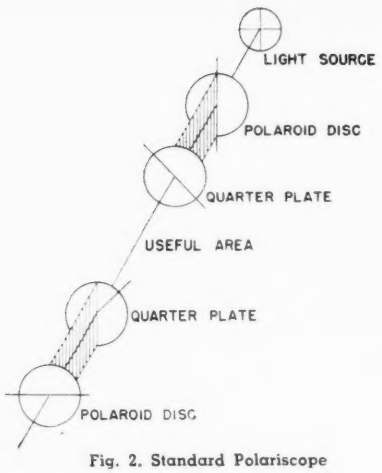


Fig. 2. Standard Polariscope

therefore generally complicated beyond the practical use of conventional mathematics of even the highest order insofar as using them to predict service behavior is concerned. We do not mean by this statement to belittle the skillful application of engineering mathematics to certain products and phases of product design of long standing in the rubber industry. These limitations apply particularly to the preliminary layout of new products, to new conditions for old products, or to an analysis of some new aspect in performance encountered in an old product.

The Role of Photo-Elastic Analysis

The design method we will describe is not a substitute for drawing board design or for the principles of mechanical engineering. It represents a valuable preliminary step for physical measurements upon which practical mathematics must always be based. From such physical measurements the established principles of mechanical engineering can suggest corrective measures.

This paper suggests the practice of the use of "models" for rubber product design on which photo-elastic effects can be produced to show the location of stress distribution. By having such an actual picture of his problem, the engineer can safely select, distribute, and profile his materials on a "model" scale. Quantitative application of this method provides a means for determining actual service stresses. These can be related to material ultimate strength for the purpose of approaching the "stress-minima" criterion of maximum dynamic life. This will eliminate uncertainty, speed design, reduce experimental material losses, and minimize much expensive product testing.

Other Methods of Stress Analysis

Photo-elastic analysis is simply one of several methods the mechanical engineer has employed in the problem of determining the magnitude and direction of principal stresses in products and structures of rigid materials.

Stress-Coat. For this same objective stress-coat technique may be used. This is based upon the use of lacquers which crack at predictable elongations when carefully applied under very exacting conditions. By selecting a range of such lacquers, one observes the amount of strain on the surface to which the lacquer was applied. From the amount of strain indicated by cracking of a particular lacquer and the application of variations of Hooke's Law, the actual direction and magnitude of stress on a product surface can be computed.

Strain Gages. The use of strain gages has become widespread. This is based upon the principle that certain metals have a known electrical resistance which changes with state of strain. Strips of such metal, adhered to surfaces under measurement, reveal the degree of strain on the surface to which they are attached. Again, from such measurements the engineer can compute the direction and magnitude of stresses on the surface of interest.

Grid or Photo-Grid Techniques. In principle, grid technique consists of laying out grids upon the surface to be studied. The linear and the angular displacement of these grids of predetermined dimensions are observed. A graphical or analytical solution is then possible. This translates the known stress-strain relations of the subject material into the direction and magnitude of the principal stresses on its surface under the conditions tested. The method of Mohr's Circles of Strain and Stress may be applied. The method of stress-strain circles is basically a procedure which can be applied to any problem of stress analysis where strain measurements can be made. It is applicable with strain gages as well as with the grid technique.

In rubber product design, because of the large strains encountered and because of the complicated nature of the stress-strain relation, these methods apparently have not found favor.

Elements of the Photo-Elastic Effect

Principles and the Apparatus Employed

Certain chemical substances, by virtue of their molecular structure or of their state of subdivision, have the capacity for polarizing light. Such materials, when laminated between suitable glass disks, form a polaroid plate which allows the transmission of light vibrating in but one plane. An additional optical principle is of importance in this technique. This is the fact that transparent or translucent materials are generally birefringent to some degree when under stress. That is to say, they develop two different indices of refraction under stress. Assume a model to be studied is made of such material, and a polarized beam of light from a polaroid plate (the polarizer) falls upon this model. It will be refracted at two different angles, depending upon the magnitude of the stress. Upon emerging from the model, these refracted beams of light either interfere with or reinforce each other. This action will form dark and light bands, or colored bands, which can be related to the stress concentrations in the model. In order to observe these effects upon light waves after they have passed through the model, it is customary to view the model through a second polaroid plate. This plate (the analyzer) is on the opposite side of the model from the polarizer.

The apparatus actually used is shown in Figures 1, 2.

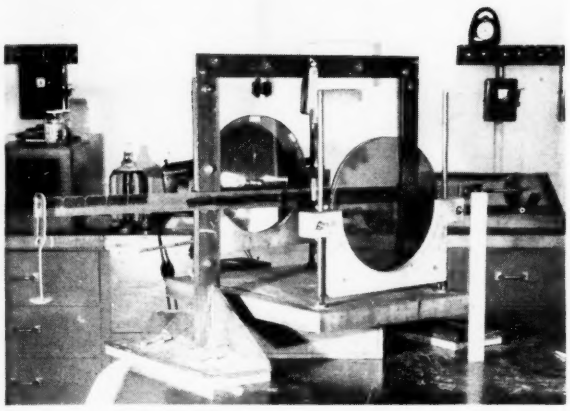


Fig. 3. Polariscope Used by the Authors

and 3. In order to produce certain stresses upon model sections, jigs were prepared for each type of loading. Mechanical lever systems, air pressure, hydrostatic pressure, and spring loading have been used in this work. A sodium light source was used when a monochromatic source was desired.

Interpretation of Photo-Elastic Lines

The condition of stress at a given point in a model can be determined by the magnitude and direction of two principal stresses. The apparatus will produce photo-elastic lines indicating the difference in magnitude and the direction of these principal stresses.

Isoclinic lines represent the inclination, or direction of principal stresses. A simple polariscope, employing polarizer, model, analyzer, and white light, will show black and colored lines on the model as viewed from the analyzer side. The black lines are isoclinic lines.

When the plane of polarization of the incident light from the polarizer coincides with the direction of one of the principal stresses, the light passes straight through the model. The analyzer plate must therefore be rotated so that its plane of polarization is at right angles to that of the polarizer. (See Figure 1.) This means that light passing straight through the model will be extinguished, or cut out, when passed through the analyzer. Therefore the isoclinic lines are dark.

The direction of principal stresses are also perpendicular to planes free from shear in the model. Planes free from shear are called "principal planes."

Isochromatic lines are the colored lines popularly associated with the photo-elastic effect. It is often desirable to examine the model from the point of view of determining the magnitude of the difference between principal stresses rather than simply their inclination. For this purpose the isochromatic, or colored lines, will be observed. In order to produce isochromatics only, (no isoclinics present) it is necessary to use circularly polarized white light. In an ideal sense, complete circular polarization is possible only with monochromatic light. To obtain circularly polarized light, it is necessary to use a quarter-wave plate on the model side of the polarizer and analyzer. (See Figure 2.) These quarter-wave plates are simply additional polaroid-like disks whose light planes are rotated 45 degrees from the light plane of the polarizer or the analyzer. They are so rotated that the light planes of both quarter-wave plates are at 90 degrees to each other.

It is a principle of the photo-elastic effect that at any point on any isochromatic line the difference between the value of the principal stresses is constant. If the model is progressively stressed, lines will appear and move steadily outward from some source point or origin of stress. The order, or "fringe order," of a line is determined from the number of lines emanating from the origin. For example, the line of fringe order five is the fifth line to have appeared at the origin as loading progressed.

For a quantitative interpretation of the photo-elastic effect it is necessary to determine the actual stress concentration to produce each line by a separate calibrating test on the model material. This is accomplished in the same apparatus set-up. A strip of the model material, cut from the same sheet or plate from which the model itself was constructed, is separately loaded. With the use of appropriate jigs and loading devices the stress necessary to produce each order of line is noted on the sample tension or compression strip. For example, if a stress of 100 p.s.i. is needed to produce a line in the specimen under tension, then the difference in magnitude of the principal stresses along a fifth order line would be five times 100, or 500 p.s.i. This assumes a linear stress-strain relation holds for such a specimen.

By definition, the maximum shear stress (S_{max}) is equal to one-half the difference between the two principal stresses.

$$S_{max} = \frac{P - Q}{2}$$ where P and Q are principal stresses.

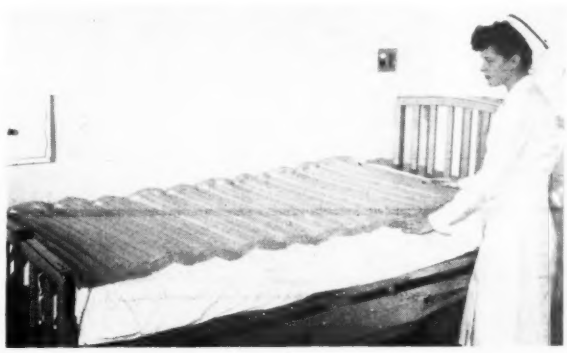
In the above example substantially pure tension is the single principal stress. The maximum shear stress along a fifth order line, therefore, would be 500 divided by 2, or 250 p.s.i.

We will defer further quantitative considerations until some typical qualitative applications have been discussed.

(To be continued)

Hospital Mattress That Massages

A MATTRESS that gently massages the pressure areas of the body of a bedridden patient and thus reduces the danger of bedsores has been announced as the joint development of Firestone Plastics Co., Akron, O., and the H. J. Rand Foundation, Cleveland, O. The mattress, constructed of Firestone's Velon plastic film, consists of a series of air cells 1¼ inches in diameter running transversely across its width. Alternate cells are connected to a manifold which forms the edge of the mattress. The two systems of interspersed cells are alternately deflated and inflated at short intervals by a small, electrically driven pump, and this action produces a massaging effect on the patient's body. Clinical tests made with the mattress since July, 1947, have shown very satisfactory results.



Studies in the Coagulation of Preserved Latex by Sodium Silicofluoride[1]

E. A. Murphy,[2] E. W. Madge,[2] and D. W. Pounder[2]

IN A previous publication[3] various aspects were discussed of the behavior of preserved latex when gelled or coagulated with sodium silicofluoride, and the need was indicated of a more quantitative investigation of the mechanism.

It was shown that gelling of a number of ammonia-preserved concentrated latices occurred at a pH value of 8 to 8.2, also that under rapid conditions of gelling the presence or absence of zinc oxide had little effect on the pH of coagulation. On the other hand, latex containing insufficient sodium silicofluoride to induce coagulation after several hours in the absence of zinc would gel in a relatively short time with the same amount of silicofluoride when zinc oxide was present.

It was decided to extend the investigation of these phenomena in an attempt to obtain a clearer picture of the factors influencing the course of silicofluoride gelling.

Several other latices of different characteristics were therefore examined, and it was found that whereas the pH values at gelling of some latices were similar in the presence or absence of zinc oxide, for others the pH at gelling was appreciably higher in the presence of zinc oxide. Examples are given in Table 1 for two centrifuged latex samples Nos. 6 and 5 referred to subsequently).

TABLE 1. pH VALUES AT GELLING WITH AND WITHOUT ZINC OXIDE

	pH—*Sample* 6		pH—*Sample* 5	
Time, Min.	Without ZnO.	With ZnO.	Without ZnO.	With ZnO.
0.5	10.3	10.3	10.2	10.3
2.0	9.9	9.6	9.9	9.8
3.0	9.6	9.2	9.4	9.4
4.0	9.1	8.5	9.0	8.7
4.5	8.7	8.2	8.5	8.5 gelled
5.0	8.2	8.1 gelled	8.2	..
5.5	8.1 gelled	8.0	8.1 gelled	..
6.0	8.0	8.0	..	..

In these examples 3.5 cc. of a 20% aqueous dispersion of sodium silicofluoride were added to each of four 50-gram samples at 60% D.R.C. and 0.5% NH_3. To two samples 1.0 cc. of a 50% zinc oxide dispersion had been added immediately before the silicofluoride addition. The pH values were determined by means of a dip-type glass electrode and a standard potentiometer.

The results in Table 1 are typical of cases where gelling occurs within a few minutes. When the quantity of silicofluoride is appreciably reduced so that gelling is very much retarded, a different behavior is observed, as was shown when the experiments were repeated on sample No. 6 with the quantity of gelling agent reduced from 3.5 cc. to 2.1 cc. The sample without zinc oxide reached equilibrium at a pH of 9.2 in 30 minutes, with a rise in viscosity but no gelling, and little further change had occurred after four hours. A sample containing zinc oxide and a similar amount of silicofluoride formed a strong gel in 100 minutes at pH 9.2.

The inference is that in the case of fast gelling the products formed by the rapid hydrolysis of the silicofluoride are alone sufficient to cause gelling at a pH of about 8. Under conditions of slow gelling, however, time is available for the zinc oxide to react with the products of hydrolysis such as ammonium fluoride, and the gelling effect of the zinc ions at a higher pH then becomes apparent. This point is borne out by the high pH of gelling which occurs with zinc oxide and ammonium salts. It was found for instance that two grams of 50% zinc oxide dispersion and three cc. of a 25% ammonium nitrate solution, when added to 50 grams of sample No. 6 (0.5% NH_3) caused gelling at pH of 9.7.

Influence of Surface-Active Substances

It was already known that in practice the behavior of sodium silicofluoride as a gelling agent could be influenced considerably by the addition to the latex of small quantities of surface-active agents. It was decided to examine quantitatively the effect of two typical substances, sodium lauryl sulfate and sodium castor oil soap. In each case the experiments were made on 50 grams of sample No. 6 latex at 60% D.R.C. and 0.5% NH_3, and the results obtained are given in Tables 2 and 3.

TABLE 2. INFLUENCE OF SODIUM LAURYL SULFATE ON pH AT GELLING

Ccs. 10% sodium lauryl sulfate	0	2	4	6
Ccs. of 20% silicofluoride dispersion	3.5	3.5	3.5	3.5
Min.	pH			
1	10.1	10.2	10.1	10.0
2	9.9	9.9	9.7	9.6
3	9.6	9.5	9.3	8.9
4	9.1	8.9	8.8	8.4
5	8.2	8.2	8.3	8.1
6	8.0 gelled	8.1	8.1	8.0
7	8.0	8.0 gelled	8.0	7.9
8	8.0	8.0	8.0 sensitive paste	7.9
20	..	..	..	7.8 stable paste

Ccs. 10% sodium lauryl sulfate	0	2	4	6
Ccs. of 50% zinc oxide dispersion	1.0	1.0	1.0	1.0
Ccs. of 20% silicofluoride dispersion	3.5	3.5	3.5	3.5
Min.	pH			
1	10.0	10.1	9.9	9.7
2	9.6	9.7	9.3	9.3
3	9.2	9.2	8.6	8.8
4	8.5	8.3	8.1 gelled	8.3
5	8.1 gelled	8.1 gelled	7.9	8.1 gelled
6	8.0	8.0	..	8.0
7	8.0	..	..	..
8	7.9	..	..	..

Table 2 shows that the addition of sodium lauryl sulfate in the absence of zinc oxide considerably affects the gelling of 60% ammonia-preserved latex; the larger amounts (over 1% on the latex) prevent gelling altogether. On the other hand, in the presence of zinc oxide (added immediately after the sodium lauryl sulfate and followed immediately by the sodium silicofluoride) all samples gelled in approximately the same time at a pH of 8 to 8.1. The 10% sodium lauryl sulfate solution was substantially neutral (pH 6.8).

The addition of castor oil soap solution, as shown in Table 3, did not influence the pH of gelling, but the larger amounts (above 1.2% on the latex) slowed it down considerably. When zinc oxide was added (immediately after the soap and immediately before the sodium silicofloride) the pH of gelling in the presence of more than one cc. of soap was approximately 8.9, and

[1] Presented before the Second International Rubber Technology Conference, London, England, June, 1948.
[2] Dunlop Rubber Co., Ltd., Birmingham, England.
[3] Madge, Pounder, *Trans. Inst. Rubber Ind.*, 23, 94 (1947).

TABLE 3. INFLUENCE OF SODIUM CASTOR OIL SOAP ON pH AT GELLING

Ccs. of 20% castor oil soap	0	0.5	1	1.5	2	4	
Ccs. of 20% silicofluoride dispersion	4	4	4	4	4	4	
				pH			
Min.							
1	9.9	9.8	9.8	9.6	9.8	9.9	
2	9.2	9.4	9.4	9.2	9.4	9.6	
3	8.1 gelled	8.7	8.9	8.5	8.9	9.2	
4	8.0	8.0 gelled	8.2	7.9 gelled	8.1	8.6	
5	7.9	7.9	7.9 gelled	7.8	8.0 gelled	8.2	
6	7.9	...	...	...	7.9	8.1	
7	7.8	...	7.8	7.8	7.9	8.1 gelled	

Ccs. of 20% castor oil soap	0	0.5	1	1.5	2	4	6
Ccs. of 50% zinc oxide dispersion	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Ccs. of 20% silicofluoride dispersion	4.0	4.0	4.0	4.0	4.0	4.0	4.0
				pH			
Min.							
1	9.4	9.6 gelled	9.0	10.0	10.0	10.2	10.2
2	8.2 gelled	8.4 gelled	9.4	9.7	9.5	9.9	9.9
3	7.7	7.6	8.2 gelled	9.4	9.0	9.4	9.6
4	...	...	7.9	9.0	8.7 gelled	9.3	9.3
5	...	...	...	8.9 gelled	8.5	9.2	9.2
6	...	...	...	8.8	8.1	9.1	8.9
7	...	...	...	8.7	8.0	...	8.8
8	7.7	...	7.8	8.4	8.0	8.9 gelled	8.8
9	...	...	...	...	8.0	...	8.8 gelled
10	...	7.6	...	8.2	...	8.8	...
12	...	...	...	...	...	...	8.5

with lower amounts the pH of gelling was higher than the corresponding value in the absence of soap, but could not be accurately observed as the pH was falling too rapidly.

From these results it will be noted that the two types of surface-active agent behaved very differently. The sodium lauryl sulfate, which is unaffected by acid, interfered with the ability of the latex to gel when more than 0.8% was present, but with the addition of zinc oxide gelling proceeded as if no addition of sodium lauryl sulfate had been made.

In the case of castor oil soap, sharp gelling occurred in the absence of zinc oxide, but the rate of gelling was somewhat retarded by the increasing alkalinity, caused by the increasing soap content. In the presence of zinc oxide, gelling took place at an appreciably higher pH, which may be due to the formation of zinc soap at the particle interface.

Influence of the Nature of the Latex on Gelling Characteristics

As samples of 60% centrifuged concentrates of different characteristics were available, it was thought of interest to compare their gelling properties in the presence and absence of zinc oxide with the results of tests such as KOH and Z.O.T. numbers that are now usually employed to give some indication of the state of latex with respect to chemical stability. The following latices were chosen for the purpose:

Sample 1. A very unstable centrifuged concentrate received after the reoccupation of Malaya, which had been stored at a relatively low ammonia content and subsequently adjusted to an alkalinity of 0.5% NH_3.

Sample 2. Centrifuged concentrate originally preserved with 0.3% Santobrite and 0.1% NH_3.

Samples 3 and 5. Centrifuged concentrates of high Z.O.T. value.

Sample 4. As *Sample* 3, diluted and recentrifuged.

Sample 6. The standard centrifuged concentrate used in the foregoing experiments.

Sample 7. As *Sample* 6, diluted and recentrifuged.

Sample 8. Average 60% centrifuged concentrate.

In each sample, including *Sample* 2, the concentration was adjusted to 60% D.R.C. and alkalinity to 0.5% NH_3, and 50-gram samples were used as in the previous experiments. The proportion of gelling agent chosen for the samples with and without one cc. of 50% zinc oxide were four and three ccs. of 20% sodium silicofluoride, respectively. The reduction in the case of zinc oxide samples was made in order that the rates of gelling should not be too rapid for accurate observation. In each case the zinc oxide was incorporated in the sample one hour before the introduction of the gelling agent. The period was chosen as it was found that there was little difference in gelling pH when determined immediately after the addition of zinc oxide and after seven hours' standing in the presence of zinc oxide.

The results are shown in Table 4, which also includes Z.O.T. and KOH values. The former were determined in accordance with the methods described by Murphy,[4] and the KOH values represent the number of grams of KOH per 100 grams of total solids required to raise the pH of a sample to 11, following the recommendation of Wren.[5]

TABLE 4. GELLING OF LATICES OF DIFFERENT CHARACTERISTICS

Sample	Z.O.T. Value	KOH Value	Gelling pH without ZnO. 0.5% NH_3, 4 Cc. 20% Silicofluoride	Gelling pH with 1 Cc. 50% ZnO. 0.5% NH_3 3 c.c. 20% Silicofluoride
1. Unstable concentrate	Too unstable to test	1.0	8.8	Gelled locally on addition of silicofluoride
2. Santobrite preserved	14	0.5	No gelling—sensitive paste at equilibrium pH of 8.0	8.4
3. High Z.O.T.	Paste	0.71	8.5	8.5
4. (3) Recentrifuged	17	0.20	8.5	8.5
5. 2nd high Z.O.T. sample	Paste	0.64	8.1	8.5
6. Standard	150	0.70	8.1	8.1
7. (6) Recentrifuged	16	0.18	8.2	8.3
8. Average centrifuged concentrate	68	0.60	8.2	8.4

The gelling pH values obtained under the conditions of testing described show a maximum variation of 0.1 on any one sample. The values in Table 4 are therefore significant outside this limit.

A number of points of interest arise out of the figures shown in Table 4. It will be noted, for instance, that the gelling pH of the unstable No. 1 sample is appreciably higher than any of the others. Although the Santobrite-preserved latex (No. 2) by contrast is excessively stable to gelling in the absence of zinc oxide, in its presence the gelling pH is within the range of the other samples.

Another feature of interest is the influence that the purification by centrifuging has on *Samples* 3 and 6. Although both Z.O.T. and KOH value have been considerably reduced by the process, there has been no corresponding decrease in the gelling pH, either in the presence or absence of zinc oxide, and the relatively high

[4] "Proceedings of the Rubber Technology Conference, London," p. 151, W. Heffer & Sons, Ltd., Cambridge (1938).
[5] *Trans. Inst. Rubber Ind.*, 18, 91 (1942).

gelling pH of the high Z.O.T. No. 3 sample still remains high after recentrifuging.

If it is assumed that in the absence of zinc oxide, gelling is finally brought about by the silicic acid, then the differences in gelling pH exhibited between different latices must be concerned with differences between the surface protections of the particles. Thus a relatively high gelling pH value would be due to relatively low degree of resistance on the part of the surface layer to the coagulating effect of silicic acid.

When little change in gelling pH occurs in the presence of zinc oxide, it can be assumed that the gelling influence of the formation of zinc complexes at the particle interface is negligible in relation to that of the silicic acid. When there is an increase in the presence of zinc oxide, presumably active zinc compounds are formed in sufficient quantity at the particle surface to exert an additional coagulative effect.

This view is supported by the results of the experiments in which small quantities of castor oil soap were added to *Sample* 6 and brought about a marked increase of gelling pH in the presence of zinc oxide (see Table 3).

Similar results were also obtained with ammonium oleate (see Table 5). It will be noted that addition of 0.1 grams of oleic acid as ammonium oleate to 50 grams of *Sample* 6 (prior to the introduction of zinc oxide) gave a difference in gelling pH with and without zinc oxide to that shown naturally by *Sample* 5.

TABLE 5. INFLUENCE OF AMMONIUM OLEATE ON GELLING

	KOH Value	Gelling pH without ZnO. 4 Cc. 20% Silicofluoride	Gelling pH with 1 Cc. 50% ZnO. 3 Cc. 20% Silicofluoride
Sample 6	0.70	8.1	8.1
+0.1-gram oleic acid per 50-gram sample	0.75	8.1	8.6
Sample 5	0.64	8.1	8.5

Particular attention is drawn to the Santobrite sample (*Sample* 2) in Table 4, in which degradation of both serum and surface layer would be expected to be at a minimum. This point is supported by the low Z.O.T. value, KOH number, and gelling pH value in the absence of zinc oxide where the coagulating effect of the silicic acid appears to be substantially inhibited.

In the presence of zinc oxide, gelling took place somewhat surprisingly at the relatively high pH value of 8.4, which suggests that the coagulation in this case is mostly due to the formation of active zinc compounds. When much lower ammonia contents were employed, the greater protection of the Santobrite preserved latex particle was apparent even in the presence of zinc oxide, as shown by a comparison of the gelling pH value of *Samples* 2 and 6 at 0.1% ammonia content (Table 6).

TABLE 6. INFLUENCE OF SANTOBRITE PRESERVATION ON GELLING

	Gelling Behavior	
	Sample 2	*Sample* 6
50-gram sample, NH_3 content 0.1%, +0.7 Cc. 10% silicofluoride dispersion	Unstable paste at pH 7.8	Strong gel at pH 7.9
+1 Cc. 50% ZnO dispersion		

Mechanism of Sodium Silicofluoride Gelling

The foregoing investigations have depended on the substantially unique behavior of sodium silicofluoride as a gelling agent. Its important property is that, when added to latex, the pH falls in a controlled manner and gelling takes place reproducibly at a definite pH which is on the alkaline side of neutrality.

In this and the previous paper by Madge and Pounder[3] the inference is made that the mechanism of the gelling action of sodium silicofluoride may be a combination of two effects: namely, reduction in pH caused by hydrofluoric acid formed as a result of hydrolysis, coupled with the coagulating influence of the liberated silicic acid. The latter may cause gel formation at pH values of 8 to 9 which is considerably higher than would be obtained if gelling had taken place as a result of a fall in pH alone.

The results of the foregoing experiments would not oppose this hypothesis, and further support is given to it by the gelling behavior of sodium silicofluoride at low ammonia contents. Table 7, for instance, shows the course of gelling with *Sample* 6 at original NH_3 contents of 0.1% and 0.5%, the former obtained by blowing down with air and readjusting the concentration to 60%. Fifty-gram samples were used with and without one cc. of 50% zinc oxide, added one hour before the introduction of the gelling agent.

TABLE 7. GELLING OF STANDARD CENTRIFUGED LATEX, OIL AND 0.5% NH_3, WITH AND WITHOUT ZINC OXIDE

	0.5% NH_3, 4.0 Cc. 20% Silicofluoride	0.1% NH_3, 0.7 Cc. 20% Silicofluoride	0.5% NH_3, 1.0 Cc. ZnO, 3 Cc. 20% Silicofluoride	0.1% NH_3, 1.0 Cc. ZnO 0.7 Cc. Silicofluoride,
	pH			
Min.				
0.5	10.1	9.4	10.1	9.4
1.5				9.1
2	10.0	8.7	9.4	8.8
3	8.8	8.2	8.4	8.3
4	8.2		8.1 gelled	7.9 gelled
4.5		7.8		
5	8.1 gelled			
6	8.0			
7		7.5		
15		7.2 incipient gelling		

For the latices at 0.1% NH_3 the quantity of silicofluoride was reduced from 4.0 to 0.7 cc., but even with so small an amount of gelling agent it will be noted that the pH of gelling with the latex containing zinc oxide was much the same as obtained at the higher ammonia contents. In the absence of zinc oxide, however, the pH was reduced to below 7.2 before a somewhat indefinite gelling at the higher figure of 8.1.

In order to examine further the possible gelling effects of silicic acid, attempts were made to reduce the pH value of latex containing "neutral" sodium silicate solution at rates comparable with those attainable with sodium silicofluoride. James[6] noted that latex could be neutralized by the addition of sodium borofluoride without gelling taking place, and it might be inferred that the difference in gelling behavior between the silicofluoride and borofluoride salts was due to the absence of the silicic acid in the latter case. This is to some extent borne out by the results of the following experiments:

Fifty grams of standard latex at 0.02% ammonia content, plus five cc. of a 20% sodium borofluoride solution gelled in 10 minutes at pH of 6.4. Another 50 grams of the same latex, plus 12 cc. of borofluoride solution, plus 1.15 grams of 33% "Neutral" sodium silicate solution gelled in four minutes at pH 7.8. A third sample, plus three cc. of borofluoride gave a stable paste at a pH of 7.8. It was found necessary to use the very low ammonia content of 0.02% as with higher ammonia contents sodium borofluoride was unable to reduce the pH value much below 9.5 owing, presumably, to the buffering action of the ammonium borate formed.

Efforts were made to liberate silicic acid from sodium silicate added to *Sample* 6, using other acid-forming substances such as benzoic anhydride and butyl formate in place of sodium borofluoride. Although there were some indications of an increase in pH value of gelling in the presence of sodium silicate, the results were regarded as inconclusive in view of the possible influence of extraneous factors, such as the presence of benzoic acid and butyl alcohol.

(Continued on page 774)

[3] *Ibid.*, 42 (1933).

Full-Spiral Tapping of *Hevea brasiliensis*—II

G. P. Spangler[1] and K. G. McIndoe[1]

THE following is the second and concluding installment of the article which was begun in our February issue and is devoted to experiments on tapping Hevea *trees on Firestone's Liberian plantations.*

Full-Spiral Tapping on a Plantation Scale

The crisis in natural rubber supplies occasioned by the occupation of Far Eastern rubber growing regions by the Japanese in 1942 made it imperative that the Firestone Plantations in Liberia increase production immediately. One method by which this increase was accomplished was the adoption on all mature seedling areas of a tapping system of 200% intensity. In this system a new panel was opened at a height of approximately 80 inches on the seedling trees. This panel was placed on the side of the tree opposite to the existing low panel, and each panel was thereafter tapped in alternating periods of 15 days; no rest was allowed the tree as a whole. Such a system of tapping required an immediate doubling of the labor force on these areas. In order to provide some of the necessary labor for this pressing requirement, it was decided late in 1942 to change the tapping system on large areas of clonal rubber from the then-existing half-spiral system to the full-spiral system. This change necessitated a very considerable amount of reorganization, but it had the desired effect of providing some of the tappers required.

The change was made under the urgency of the moment, and at that time the only information available on the effect of the system was that already mentioned[2, 3] as well as the first year's results from the experiments described in this paper. These early results tended to confirm those of published work. When, however, local experiments showed that in the second year yields from full-spiral tapping began to drop below those from half-spiral tapping and growth records were unfavorable, the clonal rubber was changed back to half-spiral tapping as more tappers became available. Thus very considerable areas of clonal rubber were under full-spiral tapping for periods of 6-12 months.

During the period over which the full-spiral system was in estate operation, moreover, various practical difficulties not usually met with in field experiments were encountered. On certain clones, especially Av.49, Tj.1, and Tj.16, some trees would not cease dripping until late afternoon. Latex had to be collected at the normal time; consequently the percentage of off-grade rubber was considerably increased. This late dripping was particularly troublesome where the latex was destined for concentration. On some particularly high yielding areas the amount of latex obtained by tapping a full task (250 trees) under full-spiral frequently rose to 70 pounds or more. The tapper might decide this amount was too much to carry, and unless strict supervision was exercised, he omitted to tap all his trees. It might be said that the obvious remedy for this practice would have been to lower the task size, but at that time the labor supply was short; complete retasking over large areas would have been necessary, and under the existing circumstances its economy was doubtful. Difficulties were also experienced in training tappers to the new system, preservation of the correct slope of tapping cut, and over-consumption of bark.

A further serious disadvantage to the system is met with in later years when it is desired to apply other systems of 100% or even 133% intensity involving the use of two cuts on opposite sides of the tree. The presence of an area of young renewing bark at some part of the tappable surface and extending completely around the tree complicates very seriously the proper placement of the two cuts. Sooner or later one of the cuts is liable to approach young bark of insufficient renewal, and yields may suffer considerable decrease while the cut is still a foot or more above the previously tapped area.

Discussion

The experimental results described in this paper have shown that under Liberian conditions continuous full-spiral tapping on every fourth day produced higher yields than half-spiral tapping on alternate days over the first year of application, but that almost without exception the yields from the former system fell appreciably below those from the latter system over five succeeding years. Out of 10 well-known clones tested, Av.256 was the only one in which this effect was not observed. Mature seedlings also showed consistently superior yields from full-spiral tapping.

In the paper of Russell[2] which describes results for clones over a maximum of two to three years, annual yields from full-spiral tapping remained above those from half-spiral tapping. In percentage relationship figures given in his Table 1, however, there is discernible a drop in this relationship for four clones during the third year, a similar drop for the group of mixed clones in the second year; while only three clones (Av.256, S.R.9, and B.D.10) showed an increase in the third year. Two others (B.D.5 and Tj.1) are doubtful since results for only six months of the second year were available. It is entirely possible that if this series of experiments had not been interrupted, those clones in which a recession in relationship was discernible would have exhibited a further recession in following years. His results with Av.256 and mature seedlings appear to have been similar to those described in the present paper.

It is not immediately apparent why we should have experienced a more rapid decrease in relationship; the reason may possibly be found in different climatic conditions in the two countries. It has not been possible in this paper to present monthly yields; these show seasonal fluctuations as well as temporary reversals in relative yields on account of panel changes. In general, however, the yields from the two systems approached one another more closely during the dry seasons (which are quite pronounced in Liberia) than they did during the wet and mid-seasons. In most cases this condition was especially so just after the wintering season. It is possible that during the seasons of higher yield, the withdrawal of latex per tapping from the full circumference cut *in a localized position on the tree* is too heavy a strain on the latex drainage area of that position. It is

[1] Research department, Firestone Plantations Co., Harbel, Liberia.
[2] "Full Spiral Tapping." R. Scott Russell, *J. Rubber Research Inst. Malaya, Comm.* 254 (1941).
[3] Annual Reports of the Rubber Research Institute of Malaya for the Years 1938, 1939, and 1940. Rubber Research Institute of Malaya, Kuala Lumpur.
[4] See our Feb., 1949, issue, p. 593.

noteworthy in this connection that the only two types of rubber which we have found to respond better to the full-spiral system are precisely those which are intrinsically low-yielding types: namely, Av.256 and ordinary seedlings. Even under full-spiral tapping the average yield of Av.256 over the six years was only 595 pounds per acre.

The possibility exists that the full-spiral system might be applied advantageously to mature seedlings. Here, however, one is likely to meet practical difficulties especially if the trees have been under a long period of previous tapping on half-spiral cuts. To superimpose a full circumference cut may necessitate at least half of its length traversing bark which has not had sufficient time for proper renewal. On older trees, furthermore, fluting of the bark and the excessive length of cut may hinder the collection of latex. The possibilities of using the system for tapping high-yielding seedling families derived from clonal crosses have yet to be investigated.

The reduction in growth velocity caused by full-spiral tapping is perhaps its most striking effect, and is one manifested on all types of rubber, whether or not they respond favorably to the system. Russell[2] presents evidence indicating that "the effect is to a large extent directly related to high latex production, the extent of retardation varying inversely with increased yield for trees of the same age and condition". This deduction, however, was of necessity based upon the results of only 2-3 years' comparisons, when the experimental trees still showed superior yields from full-spiral tapping. Over the longer period of comparison represented by our observations, there seems to have been little obvious relation between yield response and degree of growth retardation. A comparison of corresponding yield and increment relationships given in Table 1[4] will show this.

On good grounds Russell also warns against the use of the full-spiral system on trees under 24 inches in initial girth, although none of his clonal groups had attained this standard when the experiments were begun. In our own experiments on clones, only Av.49 and Av.50 had attained this girth at their commencement; the others varied between 18 and 22 inches in girth, measured at a height of 48-65 inches above the union. While Av.49 exhibited only a slight retardation of growth rate following upon continued use of the full-spiral system, the retardation in the case of Av.50 was pronounced. All the other clones exhibited a similar retardation, and the phenomenon can be attributed only in part to the application of the full-spiral system before the trees had reached 24 inches in girth. Under estate conditions trees are regularly brought into tapping on half-spiral systems when they are considerably less than 24 inches in girth. Delay in application of the full-spiral system until such a girth is attained generally brings difficulty in satisfactory placement of the full circumference cut; sooner or later at least half the length of the cut will reach young renewing bark of the previous tapping system.

The main advantages claimed for the full-spiral system are increased yields with lower costs. While our experiments show that these objectives may be attained in the first and possibly the second year of application, the effect of the system on the development (and hence the yield) of the trees in the following years was such as to nullify these advantages in the case of a number of well-known types. Only in the case of Av.256 and mature seedlings was it clear that the system could be economic as a permanent system. Av.256, however, is a clone not widely used on account of its low yield, and for reasons of a practical nature already mentioned, mature seedlings do not readily lend themselves to its application. Two other clones, B.D.5 and Av.50, show responses to the system which might qualify them for its use, but in view of other detractions to the system, we consider them doubtful risks.

It may be added that during the peak producing months of the year, it is not unusual for an average task on the half-spiral system to yield 50 pounds of latex; while individual tasks may reach 70 pounds. Fifty pounds is about the maximum load for a tapper to carry to the divisional latex station over distances of 1-1½ miles. If the two systems continued to give equal yields per acre, and the task size is reduced to 70% of that used for the half-spiral system, the tapper would have to carry an average load of 65 pounds in order for tapping costs to remain similar.

The present paper covers only a description of results from use of the full-spiral, fourth daily system (S 1,d 4,100%). There were no Sunday or holiday rests, and the only days omitted were those upon which rain prevented tapping entirely. This was about 5-7 days per year. Alternative full-spiral systems involving the use of periodic rests such as S 1,d 4,6m/9,67%, or S 1,d 4,8m/10,80%, and similar variations were not investigated. Seasonal interpolation of these resting periods might be expected to be more beneficial than regular rotation, but where available labor must be kept continually employed, seasonal rests are frequently not possible.

Records are now being taken only from four of the 11 experiments described herein. The experiment with Av.50 is being continued as being the oldest, and because the constituent trees were among the largest at the beginning of the experiments. That on P.B. 186 is being retained because the trees were the youngest in the beginning, and because they had no previous tapping history. In the experiment on War.4 the full-spiral plots are being returned to half-spiral tapping, with the object of investigating their possible recovery in vigor and yield. The experiment on mature seedlings is being retained on account of its continued favorable reaction to full-spiral tapping.

As more information on clones and their individual response to tapping systems becomes available, our own investigations indicate that exploitation of the tappable surface at heights greater than those in general use has promising potentialities. Such systems may be of 100% intensity or more and employ two cuts at different levels. They may require the use of short ladders, which we have found quite feasible with half-spiral cuts; with full-spiral cuts such high tapping becomes difficult.

Summary and Conclusions

1. Full-spiral fourth daily tapping has been compared with half-spiral alternate daily tapping on 10 clones and mature seedlings over a period of 6-7 years. The clones used were Av. 49, Av. 50, Av. 152, Av.256, B.D.5, B.D.10, Tj.1, Tj16, War.4, and P.B.186.

2. During the first year all types of rubber except Av.152 yielded more from the full-spiral tapping than from half-spiral tapping. In the second and following years this advantage was maintained only in the case of Av.256 and mature seedlings. With all other clones a depression of yields from the full-spiral system below those from the half-spiral system appeared in the second year, and this depression persisted over the remainder of the experimental period.

3. In all types of rubber, growth rate of the trees under full-spiral tapping was less than that of the trees under half-spiral tapping. The degree of retardation varied with the type, but there appeared to be no con-

(*Continued on page 779*)

Advances in Rubber, 1947-1948—III[1]

Lois W. Brock,[2] G. H. Swart,[2]
E. V. Osberg[2]

THE following constitutes the third installment of the paper on the advances in rubber for the nine-month period ending June, 1948, as read at the annual A.S.M.E. meeting held recently in New York. This article started in our January issue and will end next month.

Engineering Properties and Applications

While extensive progress has been made during the past 15 years by mechanical engineers in becoming acquainted with the engineering properties and uses of rubber in many basic forms, much more could probably be accomplished in this direction. Because of the complexity of elastomeric chemistry and compounding, the technological weight in the rubber industry falls heavily on the side of chemistry rather than engineering. Much data on the physical and mechanical characteristics of rubber are thus channeled in the direction of societies and journals predominantly chemical in nature. Perhaps for this same reason a good deal of data remains unpublished in company files. To meet this deficiency is not an easy problem, but certainly the way is pointed toward closer cooperation between the rubber chemist and engineer and the publication of more data on rubber in engineering journals. This problem has been cited, and as one contribution to meet this end, a summary has been made of recent literature concerning basic engineering properties and applications of rubber, particularly for use in springs and mounting (189).[3] Throughout this study, however, many questions are raised for which the engineer should have an answer.

Properties

There is a new rubber journal which stresses the practical applications of rubber (190). One of a series of manuals on engineering materials deals exclusively with rubber and points out that rubber, unlike steel and metallic materials, is not specified or applied as a standard formulation, as would be an SAE steel. Because rubber compositions are devised to attain the desired application properties, it is important that engineers know what properties can be provided. This manual discusses the basic properties of rubber and how these can be modified (191). With the view of presenting facts that will aid in selecting the best type of rubber for any given service conditions and help in the development of new elastomers, it has been demonstrated that chemical characteristics of a polymer such as molecular chain length, degree of cross-linking and polarity determine: mechanical behavior in the unvulcanized and vulcanized state; the ranges of temperature and deformation rate within which the vulcanized material is truly rubber-like; and dissolution and swelling in organic liquids (192). A program designed to find out how rubber properties differ with the molecular structure of basic elastomers, with the nature and amount of compounding ingredients, and with the processing of the compounding mixture has been outlined (193). Factors influencing polymer properties have been discussed with particular reference to monomer constitution, polymerization conditions, copolymerization, and cross-linking (194). In an experimental survey of the mechanical-optical properties of materials varying in nature from ideal rubber to polycrystalline plastics, the application of the technique of stress and birefringence for time-dependent behavior of these systems has been considered (195). Mathematical relations have been derived for expressing the elastic optical properties for swollen elastomers in terms of molecular dimensions and positions (196). The swelling action of ethylene glycol on natural rubber, on neoprene and Perbunan vulcanizates has been investigated (197).

Emphasis has been placed on the effect of molecular weight distribution on physical properties of natural and synthetic polymers showing its relation to processability and polymer quality (198). An evaluation of rubber-like materials has demonstrated that plasticity is a function of the average chain-length of the polymer molecule (199). A study of the thermodynamics of the strained elastomer has given consideration to entropy, energy of deformation, and volume as a basis for a general thermodynamic analysis (200). This study has continued dealing with compressibility (210), the thermal coefficient of modulus and statistical theory of elasticity (202). Some of the implications of the classical elasticity theory of infinitesimal deformations and of the more general theory of large elastic deformation of incompressible isotropic materials are related to engineering with vulcanized rubber. Attention is drawn to the desirability of taking these theories into consideration in the design and testing of rubber components (203). Citing the need of more adequate information about the dynamic characteristics of elastomeric vulcanizates, data have been presented on neoprene vulcanizates in relation to the effect of variations in filler content on such properties as resilience, heat build-up, dynamic modulus, and damping (204). The resiliency of a material has been defined as a complex stress-strain-time property, characterizing the completeness of recovery from deformation and varying in kind with the modulus of elasticity and the rate of recovery (205). In dealing with hysteresis in tension tests it has been said that the changes in properties produced by previous thermal and mechanical treatment must be taken into account when considering the suitability of a vulcanizate for a particular application, and this memory has been attributed to a breakdown of the stiffening action of the filler (206).

This subject has also been treated in another study which demonstrates that the properties of pure vulcanizates are only slightly affected by previous stretching or flexing (207). Experimental results have substantially verified the theoretical laws of photoelasticity in the range in which crystallization is absent and give qualitative indication of the variations in crystallization outside this range (208). The specific heats of unvulcanized and vulcanized rubbers as a function of their elongation have been measured (209). A comprehensive study has been made of creep, recovery, and permanent set for *Hevea* rubber and GR-S over a thousand-hour period in a range of elongation at 35° C., and significant differences in behavior of the two types of elastomers have been pointed out (210). The permanent set of vulcanized rubber containing fillers has been shown to be almost

[1] Presented before the Rubber & Plastics Division, A.S.M.E., New York, N. Y., Nov. 30, 1948. In accordance with the policy of A.S.M.E. which aims to have future papers of this nature cover the literature from June of one year through the following June, the present paper begins where "Advances in Rubber in 1947" ended, *viz.*, October, 1947, and continues through June, 1948.

[2] General Tire & Rubber Co., Akron, O.

[3] Numbers in parentheses refer to similarly numbered references in bibliography at end of this installment. Unnumbered, supplementary references are found with related articles in the bibliography.

entirely due to the way in which the filler particles are rearranged by stretching and not to a property of the rubber molecules (211). Compounding for hardness is stressed in one study, and various blends which give a range of hardness are enumerated (212, 213). The creep in shear of neoprene vulcanizates has been studied as a function of vulcanization, preconditioning in shear at elevated temperatures, and composition, with the mechanical properties in both compression and shear also listed (214).

It has been concluded that it is impractical to increase the thermal conductivity of rubber-like polymers themselves, but that this could be influenced considerably by the use of various fillers (215). Under conditions of stretch and low temperature, heat conductivity of natural and synthetic rubbers has been determined (216). The dielectric properties of elastomers have been the subject of two investigations (217, 218). Static charges originate on rubber when it is separated from a dissimilar material as it is in milling and other processing and also in various end-uses of the rubber articles. The techniques necessary to reduce these charges are presented (219).

A discussion has been given of the influence of compounding ingredients, rate of vulcanization, and amount of stretch on the extent of exposure-cracking of natural and synthetic rubbers with particular reference to GR-S (220); while special attention has been given to the discoloration of neoprene vulcanized by direct sunlight (221). Work has been reported that indicates that the resistance of elastomer compounds to stiffening during prolonged low-temperature storage is favored by the use of interpolymers made from monomer mixtures having a relatively large proportion of each component and thus obtaining mutual interference with crystallization, and also by the use of a "tight" cure which probably so impedes the movement of the polymer chain as to make crystallization difficult (222). A study has been made on the effects of prolonged storage in both the vulcanized and unvulcanized states on the physical properties of tire tread stock, with results showing that the unvulcanized stock was more stable than the vulcanizate (223).

Thermodynamic considerations have been applied to the permeability to gases and liquids of a wide range of plastic and elastic polymers (224). Work has been aimed at improving the resistance of natural rubber to oils and solvents by the use of phenol-formaldehyde resins and by chemical modifications of the rubber before vulcanization (225). Results on the diffusivity of hydrocarbon gases through synthetic elastomer diaphragms has been presented reporting the relative merits of materials studied (226). Lactoprene EV, an elastomer composed of 95% ethyl acrylate and 5% chloroethylvinyl ether, is similar chemically to polyacrylic Hycar PA, and both have such properties as high resistance to deterioration by heat, oil, sunlight (227). Hycar PA also provides resistance to ozone and gas diffusion as well as good flexing life (228). Hycar OR-25 EP (easy-processing) and Hycar OR-25 NS (non-staining) have superior processing characteristics over standard Hycar Or-25. The NS rubber differs from the EP type only in that a non-staining and non-discoloring antioxidant is used (229). A general comparison of the properties of natural and butadiene-styrene rubbers has been presented with emphasis on the different effects of compounding ingredients on the two types of rubber (230). One investigation aimed to compare the behavior of natural and synthetic rubber over the whole range of sulfur content from soft rubber to ebonite (231). A comparison of properties of principal commercial types of synthetic rubber with those of natural rubber is one feature of a book in the Commodity Series (232).

In a continuing study on the properties of hard rubber (233, 234) such subjects are dealt with as the use of organic accelerators, factors affecting color, influence of method of vulcanization, measurement of plastic yield, effect of light-absorptive pigments on electrical surface deterioration during light exposure, and influence of rubber purification. A compounding study has been directed toward improving compression properties of cellular ebonites derived from nitrile-type synthetic rubbers (235). Although GR-S has been fairly successful as a raw material for hard rubber, attention has been centered again on natural rubber, with interest in synthetics being maintained only for special uses (236).

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Properties

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(Continued on page 730)

[4] Abstract only.

Preparation and Vulcanization of Unsaturated Acrylic Elastomers—II

W. C. Mast[1] and C. H. Fisher[1]

ISOPRENE COPOLYMERS. Most of the isoprene vulcanizates had slightly lower tensile strengths, but much higher elongations than the butadiene vulcanizates (Table 3).[2] This fact and the higher boiling point of isoprene made this diene appear more attractive than butadiene as a copolymerizing monomer.

Isoprene copolymers were vulcanized successfully with (a) sulfur with various accelerators, (b) quinone dioxime and red lead, (c) benzoyl peroxide with various reinforcing agents, and (d) sulfur with litharge (Table 4). The results show that a variety of curing[3] and reinforcing agents can be used to produce different types of vulcanizate. Harder and stronger vulcanizates were obtained by using larger proportions of Furnex beads or a harder black (Micronex). Both zinc oxide and calcium carbonate (Kalvan) were employed satisfactorily as reinforcing agents in the absence of carbon black.

The isoprene-ethyl acrylate copolymer was blended with both Butyl rubber (3)[4] and Paraplex X100 (18), and the blends were satisfactorily vulcanized, both with sulfur and accelerators and with benzoyl peroxide (Table 5). The vulcanizates containing either butyl rubber or Paraplex X100 (rubbery polyester) had lower brittle points than the vulcanizates made entirely from the isoprene copolymer.

The general effect of using methyl acrylate instead of the ethyl ester in preparing the isoprene copolymers was to increase the tensile strength, hardness, and brittle point (Table 6). The vulcanizate from the copolymer made of 92% methyl acrylate, 6% acrylonitrile, and 2% isoprene had a tensile strength and elongation of 1720 p.s.i. and 500%, respectively. The use of allyl maleate instead of methyl acrylate, which required more catalyst in the preparation of the copolymer, seemed detrimental (Table 6, Expt. D117).

PIPERYLINE COPOLYMERS. The piperyline copolymers were somewhat like the isoprene copolymers in that their vulcanizates had relatively high tensile strengths and elongations. The effect of increasing the amount of carbon black was to increase the tensile strength and hardness and decrease the elongation (Table 7).

[1] Eastern Regional Research Laboratory, Agricultural Research Administration, United States Department of Agriculture, Philadelphia 18, Pa.
[2] India RUBBER WORLD, Feb., 1949, p. 598.
[3] The vulcanization of natural rubber with miscellaneous non-sulfur agents has been reviewed by Harry L. Fisher (23).
[4] Numbers in parentheses refer to Bibliography items on page 598 of our Feb., 1949, issue.

TABLE 4. VULCANIZATION OF ISOPRENE-ETHYL ACRYLATE COPOLYMER WITH VARIOUS RECIPES*

	Parts per 100 Parts of Copolymer													
Expt. No.	Captax	Zinc Oxide	Stearic Acid	Sulfur	Furnex Beads	Micronex Beads	Tuads	Red Lead	Quinone Dioxime	Other Agents	Curing Time at 298° F. Min.	Tensile Strength P.S.I.	Ultimate Elongation %	Shore A Hardness	Brittle Point °C.
933	0	5	3	0	60	0	0	10	2		180	2160	140	86	
934	0.5	5	2	2	30	0	1	0	0		180	1190	550	60	—10
937	0.5	5	2	2	0	30	1	0	0	0.35, Rodo 0	120	1230	420	71	
938	0.5	5	2	2	0	30	1	0	0	0.35, Rodo 10	60	1270	480	68	
939	0.5	5	2	2	0	30	1	0	0	0.35, Rodo 0; 0.35, Rodo 10	60	1160	500	68	
940	0	0	0	0	0	0	0	0	0	150 Iron oxide; 5 Luperco A	20†	1030	460	61	
953	0.5	5	2	2	30	0	0	0	0	1, Butesan	240	1120	490	57	
954	0.5	5	2	2	20	0	1	0	0	20, Kalvan	120	1060	570	60	
987	0	0	0	0	0	0	0	0	0	100, Iron oxide; 5 Luperco A	20†	250	870	45	
988	0.5	50	2	2	0	0	1	0	0		240	1230	320	82	
989	0.5	5	2	2	0	0	1	0	0	40, Kalvan	180	1000	760	54	
1037	0.5	5	2	2	30	0	0	0	0	2, Santocure	120	830	610	51	
1038	0.5	5	2	3	30	0	0	0	0	2, R-2 crystals	180	940	670	55	
1039	0.5	5	3	1.5	30	0	0.75	0	0	0.75, Selenac	180	1160	520	50	
1040	0	5	2	1.5	30	0	1	0.5	0	1.5 Selenac	90	810	530	49	— 8
1041	0	0	0	3	30	0	0	0	0	5, Litharge	120	590	880	35	—10
1046	0	5	2	2	30	0	1	0	0	0.5, Rotax	180	1090	540	52	— 9
1043	0.5	5	2	2	30	0	1	0	0		180	840	560	54	— 7
1053	0	0	0	0	0	0	0	0	0	5, Luperco A; 125, Rayox	10	220	860	39	
1054	0	0	0	0	0	0	0	0	0	5, Luperco A; 125, Rayca!	40	180	610	44	

*Copolymer used in the 900 series experiments was prepared in Experiment D97, Table 2; that used in the 1000 series experiments was prepared in Experiment D125, Table 2.
†At 210° F.

TABLE 5. BLENDS OF ISOPRENE–ETHYL ACRYLATE COPOLYMER WITH BUTYL RUBBER* OR PARAPLEX X100†

	% by Weight			Parts per 100 Parts		Cure		Tensile Strength,	Ultimate Elongation,	Shore A	Brittle Point	
Expt. No.	Isoprene Copolymer	Butyl Rubber A	Paraplex X100	Zinc Oxide	Sulfur	Temp. °F.	Min.	Lb. Sq. In.	%	Hardness	°C.	Tensile Product
934‡	100	0	0	5	2	298	180	1190	550	60	—10	655
950‡	80	20	0	4	1.6	298	120	1060	580	55	—11	615
951‡	50	50	0	2.5	1	298	120	1040	600	55	—40	625
952‡	20	80	0	1	0.4	298	120	1840	730	53	—57	1340
1027‡	0	100	0	0	0	298	180	2340	790	41	—65	1850
1030§	100	0	0	0	0	260	10	850	330	53	— 7	280
1031§	90	0	10	0	0	260	10	880	400	58	—10	350
1032§	80	0	20	0	0	260	20	740	470	55	—17	350
1033§	65	0	35	0	0	260	20	950	420	54	—28	400
1034§	40	0	60	0	0	260	40	1170	420	60	—36	490
1035§	0	0	100	0	0	260	40	1570	370	62	—45	580

*Butyl Rubber A contained 5 parts zinc oxide and 1.5 part sulfur; other ingredients were 0.5-part Captax, 2 parts stearic acid, 30 parts Micronex beads, and 1 part Tuads.
†Blend (100 parts) compounded with 4.5 parts Luperco A and 80 parts Kalvan; Paraplex X100 is a polyester obtained from the Resinous Products & Chemical Co., Philadelphia.
‡Isoprene copolymer prepared in Experiment D97, Table 2.
§Isoprene copolymer prepared in Experiment D125, Table 2.

TABLE 6. EFFECT OF METHYL ACRYLATE ON THE PROPERTIES OF ISOPRENE-ACRYLIC ESTER VULCANIZATES*

Expt. No.	% Ethyl Acrylate	% Methyl Acrylate	% Ammonium Persulfate	Temp. °C.	Time, Hours	Yield, %	Curing Time at 298° F. Min.	Tensile Strength P.S.I.	Ultimate Elongation %	Shore A Hardness	Brittle Point °C.
D97	92	0	0.11	74–90	2.7	95	180	1190	550	60	....
D106	83	9	0.18	75–92	3.5	92	240	890	960	57	—10
D107	76	16	0.11	75–91	2.5	90	180	1290	680	61	— 8
D108	0	92	0.24	70–89	4.7	91.5	240	1720	500	96	14
D109	62	30	0.16	75–92	4.0	90	180	1310	560	62	0
D110	40	52	0.27	72–75	3.5	97.5	....	....	....	....	....
D117†	89	0	0.41	76–92	4.0	92	120	1040	290	55	....

*Monomer mixtures also contained 2% isoprene and 6% acrylonitrile; samples were prepared as 40% emulsions with 0.75% Tergitol Penetrant #4 as emulsifying agent. Copolymers compounded as in Table 3.
†Monomer mixture contained 3% allyl maleate.

TABLE 7. VULCANIZATION OF PIPERYLENE-ETHYL ACRYLATE COPOLYMER WITH VARIOUS RECIPES*

Expt. No.	Parts per 100 Parts of Copolymer: Captax	Stearic Acid	Sulfur	Red Lead	Quinone Dioxime	Furnex Beads	Tuads	Zinc Oxide	Tensile Strength, P.S.I.	Ultimate Elongation %	Shore A Hardness
S93	0.5	2	2	0	0	30	1	5	1020	590	62
S94	0	3	0	10	2	60	0	5	1460	310	83
S99	0	3	0	10	2	30	0	5	910	420	57
S00	0	3	0	10	2	45	0	5	1340	380	75

*The piperylene copolymer was prepared in Experiment D81, Table 2; samples were cured for two hours at 298° F.

TABLE 8. COPOLYMERS OF 2, 3-DIMETHYLBUTADIENE-1, 3 AND ETHYL ACRYLATE*

Expt. No.	2, 3-Dimethylbutadiene 1, 3 %	Acrylonitrile %	Ammonium Persulfate % of Monomer	Time, Hours	Yield, %	Intrinsic Viscosity of Copolymer†	Curing Time at 298° F. Hours	Tensile Strength P.S.I.	Ultimate Elongation %	Shore A Hardness
E110	2.6	6	0.043	1.0	96	1.38	2	1340	590	65
E111	5.2	6	0.060	2.0	94	1.10	2	1080	520	70
E135‡	4.6	..	....	3.3	75	....	2	350	430	63
E136	4.6	..	0.015	1.0	95	....	3	1140	310	62
E137	10.0	..	0.012	2.5	90	....	3	1340	180	68
E138	15.0	..	0.019	2.2	70	....	1	1190	260	68
E159	5.0	..	0.010	3.5	94	1.97	2	1020	310	60
E160	2.0	..	0.012	4.0	81	2.49	2	1080	580	55
E161	10.0	5	0.048	5.5	94	1.22	2	1120	230	62
E162	10.0	..	0.025	3.5	100	Insol.	2	960	200	62
E163	2.0	5	0.028	3.0	99	2.70	2	1320	460	56
E164	5.0	5	0.025	3.0	92	1.73	2	1160	390	63
E191	2.0	..	0.012	2.0	89	....	2	950	510	49

*Samples prepared in emulsion (33%) with 0.75% Tergitol Penetrant #4 emulsifying agent; vulcanization recipe: copolymer, 100 parts; 2-mercapto benzothiazole, 0.5-part; zinc oxide, 5 parts; stearic acid, 2 parts; sulfur, 2 parts; tetramethylthiuram disulfide, 1 part; and SRF carbon black, 30 parts.
†Calculated as $\frac{\ln \eta r}{c}$.
‡Succinic acid peroxide, 0.033%.

TABLE 9. EMULSION POLYMERIZATION OF MISCELLANEOUS DIENE-ETHYL ACRYLATE MIXTURES

Expt. No.	Diene	%	% Acrylonitrile	% Dodecyl Mercaptan	% Ammonium Persulfate	% Tergitol Penetrant #4	% Solids	Temp. °C.	Time, Hours	Yield, %
D58	Cyclopentadiene	2.1	6.0	....	0.04	0.75	25	82–92	1.7	94
D74	Myrcene	2.1	....	....	0.08	0.75	25	82–92	0.8	89
D75	Myrcene	2.1	6.0	....	0.08	0.75	25	82–92	1.0	88
D76	Myrcene	2.1	6.0	0.10	0.08	0.75	25	82–92	1.0	89
D78	Allo-ocimene	2.1	....	....	1.18	0.75	25	82–92	Did not polymerize	
D89	Divinyl benzene	4.0	....	....	0.03	0.75	25	79–91	1.7	95
D90	Divinyl benzene	4.0	6.0	....	0.03	0.75	25	70–91	3.5	92
D91	Divinyl benzene	4.0	6.0	0.10	0.03	0.75	25	78–92	2.5	93
D88	2-Methylpentadiene	2.5	6.0	....	0.77	0.75	25	82–92	8.5	Polymer very soft
E27	2-Chlorobutadiene	5.0	....	....	0.79	0.50	36	80–91	7.5	96
E48	Vinylcyclohexene	3.3	6.0	0.10	0.07	0.45	43	80–90	2	96
E190†	Piperylene	10.0	....	....	0.24	0.75	33	71–91	5.2	87.5

*Moisture-free basis.
†1% Triton 720 (moisture-free basis) also used.

TABLE 10. VULCANIZATION* OF MISCELLANEOUS COPOLYMERS
(Preparations Described in Table 9)

Copolymer No.	Curing Time at 298° F. Min.	Tensile Strength P.S.I.	Ultimate Elongation %	Shore A Hardness	Brittle Point °C.
D58	180	490	1540	45	—9
D74	180	430	310	49	—14
D75	60	810	530	52	—6
D76	180	780	460	54	—9
D89	180	210	1080	50	—10
D90	180	920	420	60	—2
D91	180	560	500	60	1
E190	60	830	200	67	....

*Vulcanization recipe is given in footnote * of Table 3.
Unsatisfactory (i.e., pitted) products were obtained on attempted vulcanization of copolymers E27 and E48.

DIMETHYLBUTADIENE-COPOLYMERS. Although most of the dimethylbutadiene copolymers (Table 8) had moderately high tensile strengths and elongations, the outstanding characteristics of these copolymers were their solubility in organic solvents and the comparative ease with which these materials could be milled. Probably decreased cross-linkage was an important factor in this behavior. The viscosities of solutions containing 0.05-gram of copolymer in 100 millimeters of toluene indicated that the molecular weights of the copolymers were less than those of some of the ethyl polyacrylate and the chloropropyl acrylate copolymer samples described previously (4).

MISCELLANEOUS DIENE COPOLYMERS. The other diene copolymers studied were less satisfactory than the butadiene, isoprene, piperylene and dimethylbutadiene copolymers discussed above. Cyclopentadiene, myrcene, and divinylbenzene (Table 9) apparently yielded vulcanizable copolymers, but the tensile strengths of their vulcanizates were low (Table 10).

Copolymerization occurred with difficulty or not at all when allo-ocimene and methylpentadiene were used. Chloroprene and vinylcyclohexene gave products that could not be molded satisfactorily into test specimens because of pitting or excessive tackiness.

TABLE 11. EMULSION POLYMERIZATION OF ETHYL ACRYLATE AND POLYUNSATURATED ESTERS

Expt. No.	Polyunsaturated Monomer	%	Acrylonitrile	Dodecyl Mercaptan	Ammonium Persulfate	Tergitol Penetrant, #4*	Solids	Time, Hours	Yield, %
A259†	Crotyl acrylate	6.4	5	....	....	....	45	0.7	..
D38	Crotyl acrylate	4.0	..	....	0.005	0.5	25	1.7	85
D84	Crotyl acrylate	4.0	6	....	0.055	0.75	25	4.5	57
D85	Crotyl acrylate	4.0	6	0.1	0.055	0.75	25	4.5	91
D35	Cinnamyl acrylate	9.6	..	....	0.66	0.75	25	2.3	92
D36	Citronellyl acrylate	10.7	..	....	0.023	0.5	25	1.0	89
D37	Citronellyl acrylate	10.7	6	....	0.025	0.5	25	3.7	84
D40	Geranyl acrylate	3.2	..	....	0.01	0.5	25	2.5	82
D63	Geranyl acrylate	3.2	6	..	0.03	0.75	25	2.0	85
D64	Geranyl acrylate	3.2	6	0.1	0.03	0.75	25	2.0	84
D41	Furfuryl acrylate	2.4	..	....	0.03	0.50	25	2.0	79
D42	Allyl lactate maleate	5.2	..	....	0.005	0.50	25	0.7	56
D43	Allyl lactate maleate	5.2	..	....	0.01	0.50	25	0.7	72
D61	Diethylene glycol bis-(allyl carbonate)	7.5	..	....	....	0.50	25	0.7	91
D62	Diethylene glycol bis-(allyl carbonate)	7.5	6	....	....	0.50	25	1.2	93
D65	Rhodinyl acrylate	6.5	..	....	0.05	0.75	25	2.0	97
D66	Rhodinyl acrylate	6.5	6	....	0.05	0.75	25	2.5	84
D67	Rhodinyl acrylate	6.5	6	0.1	0.03	0.75	25	1.8	83
E204‡	Allyl phthalate	5.0	..	....	....	0.38	33	0.8	..
D86	Allyl maleate	3.0	3	0.1	0.0003	0.50	40	7.0	75
E10	Allyl maleate	0.1	..	....	0.022	0.50	32	1.2	94
D101	Methyl pentenyl acrylate	4.8	..	....	0.053	0.67	33	3.0	84
D101	Methyl pentenyl acrylate	4.8	6	....	0.053	0.67	33	2.5	91
D102§	Methyl pentenyl acrylate	4.8	6	0.1	0.053	0.67	33	1.8	93

*Calculated as 25% emulsifying agent.
†Triton K60, 0.5; and 0.5% of 30% hydrogen peroxide used.
‡Triton 720, 1% (calculated as 30% solids).
§Intrinsic viscosity of polymer, 2.14.

TABLE 12. VULCANIZATION* OF ETHYL ACRYLATE AND POLYOLEFINIC ESTER COPOLYMERS

(Preparation Described in Table 11)

Copolymer No.	Curing Time at 298° F., Hours	Tensile Strength P.S.I.	Ultimate Elongation %	Shore A Hardness	Brittle Point °C.
A259	0.5	1470	310	64	—1
D38	3	1110	300	54	—14
D84	3	1200	350	60	—5
D85	3	1220	340	59	..
D36	3	740	210	53	—14.5
D37	3	1000	230	50	—10
D40	3	1110	300	52	—19
D63	3	1310	340	58	—7
D64	1	1380	390	53	—10
D41	3	330	370	46	—15
D42	3	510	860	49	—18
D43	3	540	230	54	—14
D65	1	580	160	54	—14
D66	2	1090	220	62	—8
D67	2	1100	220	58	—7
E204†	3	190	460	33	..
D86†	4	140	1070	45	..
E10‡	2	1470	640	56	..
D101†	2	0	50	75	..
D102†	2	0	60	75	..

*Vulcanization recipe is given in footnote * of Table 3.
†Stock did not vulcanize.
‡Recipe: Copolymer, 100 parts; red lead, 10 parts; zinc oxide, 10 parts; stearic acid, 3 parts; p-quinone dioxime, 2 parts; and SRF carbon black, 30 parts.

Ester Copolymers

Copolymers of ethyl acrylate and allyl maleate had been studied previously (2), but methods for preparing rubbery products having high tensile strength had not been found. Since dodecyl mercaptan and acrylonitrile were beneficial in the earlier preparation of allyl maleate copolymers, these two materials were used in some experiments of the present study (Table 11).

Unlike the diene copolymerizations discussed above, in general the copolymerization of the polyolefinic esters with ethyl acrylate followed a more normal course with respect to the amount of catalyst and time of polymerization. The higher boiling points of the polyolefinic esters permitted the use of uniformly higher initial refluxing temperatures and minimized loss during the polymerization.

The crotyl and geranyl acrylate (12) copolymers yielded the best vulcanizates (Table 12, D63, D64, D84, and D85). Although the tensile strengths of their vulcanizates were moderately high, the ultimate elongation was always less than 400%. Crotyl acrylate was found in an earlier study (12) to have relatively little tendency to form cross-linked copolymers when polymerized with methyl acrylate in an ethyl acetate solution. Geranyl acrylate, however, readily formed cross-linked copolymers with methyl acrylate (12). The cinnamyl acrylate and furfuryl acrylate copolymers were inelastic. The diethylene glycol bis-(allyl carbonate) (24, 25) copolymer vulcanizates were not suitable for testing.

Ethyl Acrylate-Ether Copolymers

The only unsaturated ether copolymer that yielded a satisfactory vulcanizate was that obtained from vinyl ether (Table 13). The vinyl ether copolymer of Expt.

TABLE 13. EMULSION POLYMERIZATION AND VULCANIZATION OF ETHYL ACRYLATE AND POLYOLEFINIC ETHER COPOLYMERS

Expt. No.	Polyolefinic Ether	%	Acrylonitrile	Dodecyl Mercaptan	Ammonium Persulfate	Tergitol Penetrant #4†	Solids	Time, Hours	Yield %	Curing Time at 298° F. Hours	Tensile Strength %	Ultimate Elongation %	Shore A Hardness	Brittle Point °C.
D55	Vinyl ether	2.1	..	...	0.01	0.75	25	0.5	96	3	380	950	41	—19
D6	Vinyl ether	2.1	6	...	0.03	0.75	25	0.7	93	3	1280	960	48	—12
D557	Vinyl ether	2.1	6	0.1	0.02	0.75	25	1.0	94	3	910	1280	47	—10
D68	Allyl ether‡	3.0	..	...	0.03	0.75	25	1.3	88	1	<100	>2400	36	..
D69	Allyl ether‡	3.0	6	...	0.03	0.75	25	1.8	89	2	<100	>2200	45	..
D103	Methallyl ether‡	4.0	..	...	0.02	0.67	38	0.8	91.5	2	<100	100	60	..
D104	Methallyl ether‡	4.0	6	...	0.074	0.67	38	2.8	93	2	<100	100	65	..
D105	Methallyl ether‡	4.0	6	0.13	0.067	0.67	38	1.0	79	2	<100	100	68	..
D77	Allyl methyl glucoside‡§	4.2	..	...	0.03	0.75	25	0.5	95	3	140	120	59	..
E16	Diallyl glycol‡	2.4	..	...	0.06	1.25	20	1.0	92	4	100	510	42	..
E17	Diallyl glycol	3.0	6	...	0.08	1.25	20	1	87	2	510	580	45	..

*Vulcanization recipe is given in footnote * of Table 3.
†Moisture-free basis.
‡Stock did not vulcanize.
§Approximately 3.5 allyl groups.

D56, Table 13, gave a vulcanizate that was superior in combined tensile strength and ultimate elongation (1280 p.s.i. and 960%) to any of the other vulcanizates obtained in the present study. The vinyl ether copolymers made in two subsequent experiments gave pitted vulcanizates. It has been shown that vinyl ether has little tendency to form cross-linked copolymers (26). Nozaki (27) has published information on the copolymerization of vinyl ether.

An ethyl acrylate-allyl starch (14) copolymer, which appeared to be cross-linked, could not be compounded. The ethyl acrylate-allyl ether product was extremely soft and tacky, and its vulcanizates were badly pitted. The methallyl ether product (presumably of low molecular weight and plasticized with methallyl ether) also was unusually soft and sticky. The diallyl ether of ethylene glycol (13) seemed much more suitable for making vulcanizable acrylic resins than either allyl ether or methallyl ether (Table 13).

Summary and Conclusions

Ethyl acrylate was copolymerized with small proportions of 11 dienes, 11 polyolefinic esters, and six polyolefinic ethers in an attempt to prepare olefin-containing acrylic elastomers that would vulcanize readily, yielding products having improved rubbery characteristics. In general, the resulting copolymers were insoluble in organic solvents, presumably because of cross-linkage. Acrylonitrile and dodecyl mercaptan appeared beneficial in the copolymerization of ethyl acrylate with polyolefinic esters, but of questionable value in the diene polymerizations.

The best vulcanizates from the standpoint of tensile strength and elongation were obtained from an ethyl acrylate-acrylonitrile-vinyl ether copolymer. Some preparations of this copolymer, however, had a tendency to pit and bubble during vulcanization.

Isoprene, piperylene, and 2,3-dimethylbutadiene were more suitable for preparing vulcanizable ethyl acrylate copolymers than the other dienes studied; their vulcanizates had moderately high tensile strengths and elongations. Some of the dimethylbutadiene-ethyl acrylate copolymers were soluble.

Crotyl acrylate and geranyl acrylate, when copolymerized with ethyl acrylate, yielded copolymers that gave vulcanizates having moderately high tensile strengths and elongations ranging from 300 to 400%.

The physical properties of the vulcanizates prepared from unsaturated acrylic copolymers were not superior to those of the chloropropyl acrylate and chloroethyl vinyl ether products described previously (4, 7).

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Pentadiene-1,3, made by the pyrolysis of the corresponding glycol diacetate (10), was kindly supplied by L. E. Schniepp, of the Northern Regional Research Laboratory.

C. E. Rehberg and Marion B. Dixon prepared the alkenyl acrylates (12) and some of the other polyolefinic esters, including the maleate of allyl lactate (28).

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(*To be concluded*)

EDITORIALS

Rubber Industry at the Crossroads?

THERE are many reasons for believing that the rubber goods fabricating and the synthetic rubber producing industries in the United States, and the natural rubber producing industry in the Far East, are all approaching a crossroads at which they must each decide whether to continue along the paths representative of their present policy or to make a distinct turn in a different direction.

For example, the fabricating industry in the United States, which is very much involved in the synthetic rubber producing industry as operators of the government plants, should soon be freed from the restrictions of the wartime patent cross-licensing and exchange of information agreements and also should soon be able to make definite plans for the purchase of some of these plants, if it so desires. Under the provisions of Public Law 469, arrangements for terminating the patent pool have been worked out and should be acted on as soon as an understanding is obtained with the Canadian Government, which is a partner in this pool. The initial report on plans for disposal of the synthetic rubber plants is to be presented to Congress by April 1, 1949, and final recommendations are required by January 15, 1950.

Public Law 469, under which mandatory consumption of synthetic rubber is required, expires on April 1, 1950, and unless this law is renewed, the United States Government may then be out of the rubber business.

Of course for security reasons the government has indicated that it may stay in the rubber business for an indefinite period of time, but one spokesman for a major company, Harry E. Humphreys, Jr., president of the United States Rubber Co., has indicated in a recent talk before the Chamber of Commerce of the State of New York that his company feels that the government should get out of the rubber business at the earliest possible moment consistent with national security, and stay out. Mr. Humphreys stated that his reason for taking this position was his fear that with the forthcoming surplus of natural rubber, our government in meetings with representatives of countries having a major interest in natural rubber production might agree to a production restriction scheme for both natural and synthetic rubber. Such a scheme might result in higher costs to rubber goods manufacturers in the United States for one of their basic raw materials, with resultant higher prices to the American consumer.

Much is to be said in favor of taking the rubber business in this country out of the hands of government officials and back into the hands of private industry. It cannot be denied that conditions in the present-day world require more emphasis on national security and that not so much can be left to chance in the event of another world war. It is understood, however, that even if mandatory consumption of synthetic rubber in the United States were no longer required by law and most of the producing plants were in standby condition, these plants could be reactivated within 90 days. Although details of our national natural rubber stockpile are not common knowledge for obvious reasons, it is not likely that we will ever again have less than one year's supply of natural rubber on hand for emergency use.

What then, is to prevent the government from giving serious consideration to discontinuing its ownership of the synthetic plants and the removal of all obstacles so as to permit real competition between natural and synthetic rubber in the near future? With the advent of low temperature GR-S and the possibility of increased acceleration in research and development on synthetic rubber with the end of the patent pool, the chances for survival of synthetic rubber on its own merits are good. Already the production and sale of neoprene is on a private industry basis, and it is quite likely that private industry would welcome an opportunity to produce and sell Butyl rubber on this basis also. When the price of natural rubber is above 20¢ a pound, the production and the sale of general-purpose synthetic rubber in the United States are considered a profitable venture on a private industry basis. In addition, a significant amount of GR-S was consumed in the United States on a voluntary basis during the past year when the price of natural rubber was at or below 20¢ a pound for about one-third of the year.

Natural rubber producers, in general, seem to favor some sort of restriction and regulation scheme, but some producers feel that free competition between natural and synthetic rubber might be a better course for the natural rubber producers to pursue. H. T. Karsten, director and manager of the United Baltic Corp., Ltd., London, England, takes this position in Lockwood's *Rubber Report* for February 15 in his discussion of "The Long-Term Outlook for Rubber." After reviewing possible future trends for both natural and synthetic rubber production and consumption, Mr. Karsten states:

"My conclusion would therefore be that we should try to stand on our own feet, and however unpleasant the intervening period may be, look forward with reasonable hope to better things to come."

This commendable conclusion might well be adopted by the synthetic rubber producing industry in the United States, if and when our government will allow that industry an opportunity to "stand on its own feet."

Thus the rubber industry, to use the broad general term so as to include the fabricating and the rubber producing branches, is rapidly approaching a crossroads. Down one fork is the old and unsuccessful method of restriction and regulation of rubber production with its disadvantages to the rubber goods manufacturer and the ultimate consumer; while the other fork offers the possibility of free competition between all types of rubbers with the resultant long-term advantages to all producers and users. It is our earnest hope that the latter course will be chosen.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Selection and Maintenance of Hydraulic Presses[1]

Adolphe J. deMatteo

WHEN the automobile industry celebrated its golden anniversary in 1947, it was observed that the modern automobile is basically the same as 50 years ago. Fundamental changes have not occurred, but improvements have been made principally in the form of refinements in detail. So it is with hydraulic presses, which still operate on the principle discovered by Pascal almost 400 years ago.

Despite the antiquity of the hydraulic press many improvements have been made to give the machine its modern refinements and its flexibility. In order to facilitate the discussion which follows, we will review briefly the basic principles underlying the design and operation of hydraulic machinery. Commencing with definitions of the principal technical terms, we will proceed to demonstrate the basic law of the hydraulic press and its extension to modern machinery used in plastics production. We will then discuss the selection of machinery for production jobs and conclude with a discussion of some of the more important factors involved in the maintenance of hydraulic machinery.

Principles of Press Operation

Perhaps the two most important terms, when hydraulic presses are being dealt with, are "force" and "pressure." While these two concepts may seem elementary, there is an astounding amount of confusion arising from lack of understanding of these terms on the part of otherwise very competent men.

Force may be defined as a push or a pull exerted on some object. When a hydraulic press closes dies, it exerts a force. Force is generally measured in pounds or tons. The capacity of a press is the force that the press is capable of exerting; a 500-ton capacity press can hold dies closed with a force of 500 tons.

Pressure must be strictly defined as force per unit area and is measured in pounds per square inch or tons per square foot. The concept of pressure involves two factors, force and area. A pressure of 2,000 pounds per square inch means that for each and every square inch of the surface being considered there is a force of 2,000 pounds being exerted.

The hydraulic press is based on a principle known in physics as Pascal's Law. This law states that pressure exerted upon a confined liquid is transmitted undiminished to all surfaces in contact with that liquid. Figure 1 shows a tube closed at one end and fitted with a sliding plunger. If the tube is filled with some incompressible fluid, such as water or oil, we can exert a force on the liquid by pushing on the plunger. If the plunger has an area of exactly one square inch, we then have a force per unit of area. This pressure is transmitted by the fluid to the walls and closed end of the tube.

If we were to make an opening in the tube and connect it with a similar but larger tube, we would have the basic hydraulic jack as shown in Figure 2. If the sliding piston in the larger tube has an area of 10 square inches, and if we remember that the smaller tube has an area of one square inch, we can see that any force applied to the smaller plunger will be multiplied ten times. Thus, if we apply a force of one ton on the smaller plunger, we will have a force of 10 tons at the larger piston, but the fluid pressure everywhere in the system will still be one ton per square inch.

If we substitute a pump for the smaller plunger and make some mechanical modifications of the larger tube by adding an upper platen and some columns or tie rods, we have the basic hydraulic press shown in Figure 3. In this figure we have also added some plain hand-operated stop valves for control. By closing or opening the valves we can either admit pressure to the cylinder or cut off the flow of pressure and permit the discharge of fluid from the cylinder. We assume that the piston will return to its original position by gravity. Very similar presses are used for die hobbing, and this press could be used for simple compression molding although it would be a little awkward. It should be noted that this figure shows a single acting ram; that is, it is capable of exerting force in one direction only, if the effect of gravity is neglected. In order to obtain a force in the other direction we must add pushbacks or make the piston double acting.

Figure 4 shows a modern transfer molding press which has basically the same structure as previously shown. The main ram in this press is double acting and is provided with an internal jack ram for fast closing. The hydraulic system is such that the pressure fluid is first directed to the jack ram which because of its small area causes the dies to close rapidly. While the main ram is moving upward under the force of the jack ram, the main area must be filled with fluid. This action is accomplished by an automatic valve, called a prefill valve, which permits this area to fill by suction.

At some determined point in the closing stroke the pressure fluid is diverted to the main area. Since the same volume of fluid is being applied, the ram slows down to what is termed its pressing speed. When the dies are closed, the transfer ram may be driven downward by the pump. At the end of the molding time pressure fluid is admitted to the annular area around the transfer ram, and this ram returns. When the transfer ram has completed its return stroke, pressure fluid is applied to the annular area of the main ram and released from the larger area, and the main ram is now driven downward. It may be necessary during this stroke to exhaust a

[1]Presented before the annual technical conference, Society of Plastics Engineers, Inc., Philadelphia, Pa., Jan. 21, 1949.

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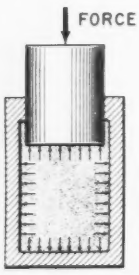


Fig. 1. Drawing Demonstrating Pascal's Law of Hydraulic Pressure Transmission

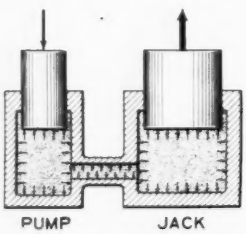


Fig. 2. Drawing Showing the Basic Hydraulic Jack

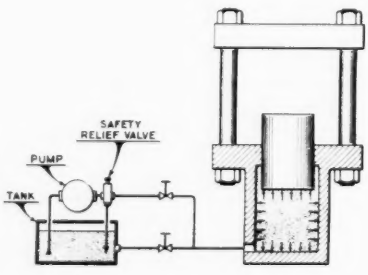


Fig. 3. Drawing Showing the Basic Hydraulic Press

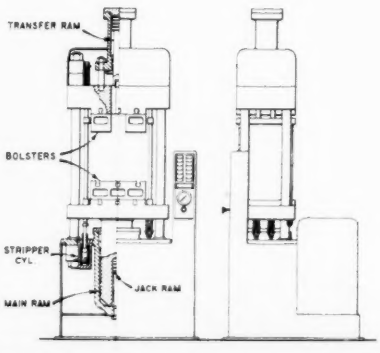


Fig. 4. Drawing Showing the Constructional Features of a Simple Transfer Molding Press

large volume of fluid from the main area, and this condition is usually achieved by using the prefill valve.

Press Selection

In a discussion of hydraulic presses for compression and transfer molding we can list the features desired in a press for production work. The first consideration might be adequate die space; second, ample capacity; third, sufficient speed; and fourth, flexibility.

Die Space. The question of adequate die space is a matter of judgment. Everyone wants the largest die space possible, mostly for elbow room, but the greater the die space the higher the cost. Most press builders have more or less standardized press models which for equal capacity have approximately equal platen area. These fixed sizes have developed over the years and are based on what is satisfactory to the majority of molders. Deviations from these fixed sizes may be costly and unnecessary.

Large daylight openings may be really essential, as for setting inserts or for long draws. It is easier to vary the daylight opening of presses since, for the ordinary four-column type of press, this change means only one in the length of the columns. In this connection we might mention press stroke. Large daylight openings may require longer strokes, or additional bolsters with thin dies. Stroke cannot be increased easily since it means pattern changes for the cylinder and ram. A change in the length of the cylinder may also make necessary a change in the height of the supporting base, which leads to further complication and expense. Another point to be considered is that when longer strokes are used, the mold closing and opening time is increased, which increase, of course, lengthens the overall cycle.

In summary, die space, while primarily a function of the maximum size of die, is usually determined by the standard sizes of presses available which, in turn, are governed by press capacities.

Press Capacity. Consideration of press capacity cannot be divorced from consideration of die size, but also involves another factor, material. Force required for molding is determined by projected die area and the material being molded. The projected area is that area bounded by the plane outlines of the molding. These plane outlines must include the area covered by flash in flash or overflow molds, and the land area in semi-positive molds. For example, if a die has six cavities each two inches wide and four inches long, it has a projected area of 48 square inches.

Molding pressure depends on the specific material formulation being used and may vary from below two to over eight tons per square inch. It is also desirable to increase the estimated required molding pressure by 500-750 pounds per square inch for each additional inch of depth. If we assume an average value of three tons per square inch, the die previously referred to as having a projected area of 48 square inches would require a press having a capacity of at least 144 tons. With this figure we can now select a press capacity.

The actual size of press selected would be governed by the degree of ignorance of the material and molding involved. If the assumption of three tons per square inch was a very safe one, a standard press of 150-ton capacity might serve very well. On the other hand, if the three-ton figure was a close estimate, a 200-ton press should be used. When too small a press is selected, it may be necessary to blank off and not use some of the mold cavities, and on extended runs the consequent loss would outweigh by far the cost of the extra capacity. We cannot pass over this point of press capacity without warning against figuring too closely. The other extreme, that of using too large a press, is also wasteful, but is not fraught with the dangers attendant the selection of too small a press.

In summation, the capacity of the press selected is determined by the area to be molded and the material to be used, seasoned with some good judgment.

Press Speed. In compression molding it is desirable to close the dies and contact the material very rapidly and then press at a much slower speed. When the molding is completed, the die should be opened quickly. This system saves time, while the dies are, in effect, cutting air, and yet slows the press so that the material has time to flow in the cavity. In transfer molding this same system is also desirable.

It is not good practice to slam the dies closed at high speed. We should close rapidly and slow down just before the dies meet. In the standard press models previously mentioned, press capacity and pressing speed determine the size of the pumping unit. With the pumping unit size known the other speeds are then determined by consideration of the sufficient force at rapid traverse speed to lift the weights of the moving platen, ram, and dies. The pullback speed is fixed by the need of having sufficient force to strip the dies.

In a self-contained press the speed is determined by pump volume and ram area. Horsepower is a function of the product of volume and pressure; thus for equal press capacity more speed means more horsepower, and more horsepower means increased price. However, additional speed may mean a decrease in product cost.

A pump furnishes the press with hydraulic fluid at a pressure and volume which can generally be varied within limits, depending on the pump and valving arrangement. While there is an infinite variety of combinations of pumps and valves, we can classify pumps into two main groups: constant delivery and variable delivery. A constant delivery pump, as its name implies, furnishes a fixed volume of fluid. Since horsepower is proportional to the product of pressure and volume, a constant delivery pump is essentially a constant horsepower pump. When the press stops and maintains its force, as when it holds the dies closed, the only outlet for the hydraulic fluid is through a relief valve. All the horsepower is converted to heat in the fluid, and this condition is a basic limitation of the constant delivery pump in plastics work. Advantages of the constant delivery system are its cheapness, simplicity, and ease of maintenance.

In larger self-contained systems for plastics work some scheme for reducing the heat input must be employed, or the cost of operating the press become prohibitive. Of course, when small pumps are used, there is no great loss in blowing a relief valve. The usual arrangement for limiting horsepower input and yet providing enough volume for fast cycles is to use two pumps, one large and one small. The larger pump is used to achieve the fast movements. When the press has closed, the larger pump is by-passed, and the smaller or holding pump holds the press closed.

With the variable delivery pump the volume of fluid can be changed. In plastics work the pump controls are so arranged that the volume delivered remains constant until some predetermined pressure is reached. At that pressure the pump automatically reduces its volume delivered to that just sufficient to hold the pressure. With this system it is unnecessary to blow a relief valve, and only the horsepower actually required to do the work is used. This system represents a great saving in operating cost, but variable delivery pumps are expensive.

Over the years our practice has shown that 250 tons seems to be the dividing line between constant and variable delivery systems. Below 250 tons the constant delivery systems seem to be more economical or at least more acceptable to the majority of molders. Above 250 tons variable delivery systems seem to be the rule. Of course these rules have many exceptions, but are mentioned here only as an example of present-day practice.

We cannot leave the subject of speeds and pumping units without mentioning the accumulator system which provides high- and low-pressure fluid for press operation. Over the past eight or 10 years the accumulator system seems to be going the way of the steam engine. However there can be no question that where a large number of presses are used on cycles having long holding times, the accumulator system offers economies over an equivalent self-contained press set-up.

Where short cycles predominate, as in transfer or injection molding, the self-contained press is the rule. We believe that the advent of the newer methods of molding with their shorter cycles has been the cause of the decline in use of accumulators, rather than any inherent disadvantage. In setting up a molding plant consisting of 20 presses for laminates or rubber molding where long cures are used, we would unhesitatingly recommend an accumulator system. On the other hand, if it were necessary to add one or two presses in an accumulator plant where, as is often the case, the accumulator system was already overloaded, self-contained presses should be used.

Press Flexibility. Flexibility is the ability of a press to adapt itself to all manners of molding operations. Perhaps the most important necessity for flexibility is pressure control, and any press for general usage should permit control of its capacity. This is easy to do with self-contained presses. With accumulator operated presses it can only be done by resorting to pressure reducing valves, which can be troublesome and difficult to maintain.

Another important factor for flexibility is speed control. While almost all self-contained presses are built with some means for pressure control, speed control is more likely to be an optional feature. An important factor to bear in mind when requesting speed control is that very often the change in volume will affect all parts of the cycle. Thus, while it may be desirable to slow down only the pressing portion of the cycle, the circuit may be such that the fast closing and opening movements may also be slowed down.

In standardized press models it is easy to provide speed control from the standard maximum on down, but it becomes difficult to make substantial increases in speed. Such an increase needs not only larger pump and motors, but may also require larger valves and piping and larger openings into the cylinders. Thus a substantial increase in speed over a standard model may require considerable engineering.

When selecting automatic presses be sure the press has all the features you want when it is built. It is relatively easy to build a press with double degassing, but you may find it expensive to rip out wiring in order to install another timer and perhaps a relay after the press has

been delivered to your plant. If you need special features for a particular job, by all means specify them when you buy the press. On the other hand, if you have no particular need of special features, then do not ask for them. Special features on a press are like accessories on an automobile; they are pleasant to have around, but cost money and add maintenance.

We cannot emphasize too strongly the importance of specifying clearly exactly what you want the press to do. The best way to show what you want a press to do is to draw a cycle diagram. Figure 5 shows a cycle diagram which does not represent any particular press, but illustrates what can be shown. Stroke is plotted against time, and the slope of the line approximates the speed; that is, a steeper line indicates a faster speed.

The sections of the line or curve have been marked off and numbered to aid in discussing what is wanted in each portion of the cycle. Section 1 is rapid closing, and here one can specify the desired speed range. Section 2 is slow closing and again specifies speed or, if speed control is wanted, the range of speed. Section 3, 5, and 7 are first, second, and third curing times respectively, and one may specify a fixed or adjustable capacity together with a time range for each cure. Sections 4 and 6 represent first and second degassing, respectively, and capacity or range of capacities for each degassing may be specified. Section 8 represents slow breaking of the mold; Section 9 shows fast opening; and Section 10 shows a slow stripping action. If a second ram is to be used, as for transfer molding or for actuating mold cams, the cycle diagram for the auxiliary rams can be superimposed on the main ram diagram so as to show its motion with respect to movement of the main ram. In this manner it is easy to describe clearly the functions that are desired in a special press cycle.

Selection of Injection Machines

Up to this point we have confined our discussion to presses of the compression molding type, but there is another important field of plastics molding in which machines must be selected, that is, injection molding. In this field, however, we are practically restricted to standard machines which are rated on the basis of ounces of material which can be molded per cycle. These machines range in size from one ounce to 48 ounces and larger.

The usual method for selecting an injection molding machine is to compute the weight of the shot and the area of the piece or pieces and then select the machine accordingly. Of course the weight of the runners and sprue must be included in the weight of shot. Injection molding machines are complex, highly developed devices, and there is little demand for anything which deviates very radically from standard practice. Volumes could be written comparing one design or make of machine with another, but such a discussion would be beyond the scope of this paper.

Press Maintenance

In discussing maintenance of self-contained presses, we must keep in mind the fact that the pumps and valves are made to the most exacting tolerances, and even the slightest wear may be intolerable. Fortunately the working fluid is a high-grade lubricant and is supplied to the working parts under high pressure. For this reason the most important factors in assuring long equipment life are the cleanliness and the quality of the oil. When proper attention is paid to the amount and the quality

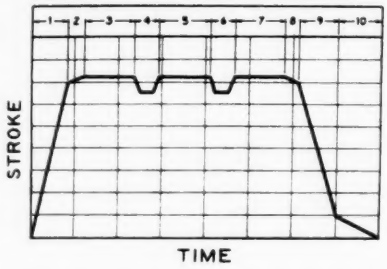


Fig. 5. Typical Cycle Diagram for Specifying Press Operation

of the oil, the machine should last indefinitely.

Although the oil reservoir is carefully sealed on most machines, dust and dirt do get into the tank. Because of the extreme fineness of the abrasives encountered in plastics molding, we have found that conventional strainers or screens are not too effective. We have also found that periodic removal of the oil charge for cleaning does not suffice, unless performed at prohibitive frequencies to prevent the heavier particles from gathering in inaccessible reservoir areas from which they are difficult to remove. If mechanical filters are used, the edge-wound and cellulose micronic types are recommended.

The most economical and successful results have been obtained by independently by-pass filtering the oil while the press is in active service. Motor-driven portable units may be used for this purpose. The method consists of inserting the suction hose into the oil reservoir at a point removed from the pump suction and discharging the clean oil into any convenient opening. Since the oil is turbulent during press operation, most of the extraneous solids are in suspension and can be filtered off.

Besides collecting dirt the oil will also change character over a period of service. While many complex changes take place, we may lump them more or less accurately under the heading of oxidation. The end result of this process is a change in viscosity and increase in acidity of the oil. In addition, gums or varnishes are deposited on the highly polished working surfaces in contact with the oil.

These changes in character of the oil are the result of chemical action. Since chemical changes are accelerated by heat, it would seem logical to run the oil as cold as possible. Of course, this action would not be practical since the increase in oil viscosity at low temperatures would have other undesirable effects. The best compromise, therefore, is to operate at an oil temperature between 100 and 120° F. and under no circumstance permit the temperature to exceed 135° F.

Available oils differ in ability to resist chemical change. While considerable difference of opinion exists on this point, we believe that the neutralization number, as shown by the standard ASTM test, most accurately reflects the condition of the oil. It is recommended that the oil be tested for viscosity and acidity once a month for the first three months, and then once every three months. These tests may be made by the oil supplier or by an independent laboratory. Oil test samples should be taken at the drain plug while the machine is in active operation. The sample should comprise not less than one quart and preferably one gallon. The oil analysis may also be used to check demulsibility, water content, sediment, and additive content.

It is characteristic of hydraulic oils that they will maintain their properties for a long period of time and then break down at a continuously accelerated rate. It is therefore good practice to plot curves of viscosity and neutralization number against time. When the curves show a break indicating that oil breakdown is beginning to take place, it is time to replace the oil.

The generally acceptable limits for neutralization number are from 0.8-2. The acceptable limits of viscosity will be determined by the pumps and valves used in the hydraulic circuit and can be ascertained from the builder of the equipment. The question often arises as to the length of time oil may be used in the machine. If the fluid system is filtered and periodically tested, the oil may be retained in service for several years, particularly at temperatures below 120° F.

There are many other phases of good preventative maintenance practice, but these are common to all machines and can therefore be excluded from a paper devoted only to hydraulic machinery.

Summary and Conclusions

Despite the antiquity of the hydraulic press, tremendous improvements have been made to give the machine its many modern refinements and flexibility. In plastics molding the most important factors in the use of the modern hydraulic press are its design, selection, and maintenance.

Commencing with definitions of the principal technical terms we have demonstrated the basic law of the hydraulic press and its extension to modern machinery used in plastics production. The application of these principles to the selection of machinery for specific production jobs has been discussed together with some important points in the care and maintenance of hydraulic machinery.

In conclusion I wish to express my appreciation to Richard W. Dinzl and James S. Wilson, of Watson-Stillman for advice and counsel on this paper.

New Phenolic Compound

A NEW phenolic molding compound, Durez 14300 Black, has been placed on the market by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. The material is a general-purpose type which incorporates certain flow characteristics needed by the thermosetting molders.

The new compound flows readily, but has a relatively short time of flow, thereby quickly building up back pressure in the mold. This property is desirable where the mold escapements are looser than normal because of wear or other reasons. When used in flash or semi-positive molds that have been in production for a long time, Durez 14300 will provide sufficient back pressure to obtain satisfactory density and surface finish without excessive flash.

Curing time of eight-plasticity Durez 14300 is approximately 15% less than a typical general-purpose material of the same plasticity; while molding pressure is the same. Surface appearance is excellent, it is also claimed. Molding temperatures between 320 and 350° F. are satisfactory, and preforming characteristics are good. For plunger molding, plunger pressures of about 8,000 p.s.i. are required, but runners and gates must be relatively large because of the material's short-flow property. Physical properties of the new compound are similar to those of standard general-purpose materials.

SPE Sections Hear Plastics Experts at Monthly Meetings

THE New York Section, Society of Plastics Engineers, held its first meeting of 1949 on February 8 at the Hotel Sheraton, New York, N. Y. Approximately 40 members and guests attended the dinner and heard William H. MacHale, advertising manager, plastics department, American Cyanamid Co., speak on "Melamine Tableware," and John E. Currier, F. J. Stokes Machine Co., discuss "Automatic Molding."

Mr. MacHale discussed the development of melamine tableware, starting in 1944 when American Cyanamid began investigating peacetime applications for melamine. The different melamine grades were tested for appearance, moldability, resistance to staining, etc., and Melmac 1077, an alpha-cellulose filled type, was selected. Tableware designs were drawn up, and test sets of melamine tableware molded. These sets were subjected to extensive service tests in various restaurants. Although good results were obtained, these service tests indicated the importance of proper handling of the melamine ware by restaurant employes, the need of proper washing procedures and of suitable stain removing treatments at periodic intervals. These factors were noted, further investigated, and remedied by the recommendation of proper procedures. Melamine tableware is enjoying increasing popularity despite its relatively high initial cost because of its much longer service life and decreased breakage factor.

Mr. Currier preceded his talk with a running of the Stokes color-sound film, "Robots at Work," showing the operation of the company's automatic compression presses. The speaker began by defining an automatic molding press as one in which the machine completely takes over operations after it is set and the hopper filled, and delivers finished parts to a receiver. The Stokes line of automatic presses includes three standard models, two closure presses, and two stripper presses.

Advantages of automatic molding, according to Mr. Currier, include: (1) low labor cost, since skilled employes are not needed, and one man can tend as many as 10 machines; (2) low mold cost, since the machines operate around the clock and by using a small mold equal the output of semi-automatic machines having larger molds; (3) 24-hour production; (4) uniform quality, since cycles are maintained with clockwork precision and are not dependent on the operator; (5) material savings, since the feeding devices accurately deliver the exact quantities of material needed to each cavity; and (6) reduced inventories, since molding can be geared to customer demand. Limitations of automatic molding are: (1) cannot be used with inserts; (2) avoid undercuts, since parts must be ejected vertically; (3) knockout pins are necessary; (4) thick sections are not economical; and (5) maximum bulk factor must be 3.5:1.

Selection of automatic molding machines should be based on suitable cost studies, Mr. Currier said. Such studies should include careful attention to part and mold design; the mold design service offered by Stokes; calculation of the number of cavities; material cost; heat and power cost; press labor; finishing, amortization, depreciation, and maintenance costs; and required profit margin. Consumers of molded parts have given almost universal approval to automatic presses for the reasons given above, the speaker stated, and it is becoming apparent that custom molders must modernize their shops with equipment incorporating labor-saving devices.

The meeting was presided over by Vice President Sam Silberkraus, Regal Molding Corp., in the absence of President Stanley Bindman, Noma Electric Corp. In the business session preceding the talks, reports were heard from Secretary-Treasurer George Barron, Ideal Plastics Co., and Program Committee Chairman Palmer Humphrey, consultant. Table favors consisting of attractive plastic salt-and-pepper sets were distributed through the courtesy of George Leaf, Leaf Plastics Co., and the meeting closed with a drawing for door prizes, including one contributed by Bruno Wessinger, Wess Plastic Molds, Inc.

Guest Engineers at Newark Session

The Newark Section held a guest engineers' meeting on February 9 at the Newark Athletic Club, Newark, N. J. The program began with an afternoon exhibit of plastics products made in the Newark area, together with a display of award winners in the recent Modern Plastics Competition. There were also afternoon showings of the SPI film dealing with the testing program on mechanical properties of plastics under way at Massachusetts Institute of Technology. Following dinner, the evening session featured talks by Hiram McCann, *Modern Plastics*, entitled "Where Do We Go from Here?", and C. W. Blount, Bakelite Corp., on "An Engineering Evaluation of the Plastics."

Mr. McCann's talk described the growth of the plastics industry and stressed the need of sales aggressiveness to promote further growth in a buyer's market. The speaker pointed out that opportunities for increased use of plastics lie in the television, refrigerator, household appliance, automotive, packaging, architectural, construction, and home decoration fields.

Mr. Blount emphasized that in using plastics, as with any other material, the engineer must choose the right type. The first step in selection is to set forth both the properties essential and desired in the finished product. Choice of the plastic material can then be made on the basis of its properties, price, fabricating technique, and general economic conditions in the use of plastics for this application.

Rochester Section Meets

The Rochester Section, SPE held a regular dinner-meeting on February 15 at the Elks Club, Rochester, N. Y. Approximately 43 members and guests heard Frank J. Donohue, Monsanto Chemical Co., speak on "Trouble Shooting of Molding Problems." Mr. Donohue's talk was similar to that which he presented at the Society's annual technical conference and gave a general picture of the problems involved in the molding of thermosetting materials. The roles played by material, part design, mold design, and molding conditions in the solution of these problems were illustrated and discussed. A brief talk was also given by member Ernest Goral, Stromberg-Carlson Co., describing his work in the plastics field. This talk was one of a series designed to familiarize members with each other's activities.

The group held a dinner-meeting on January 18 at the Wishing Well, with about 35 members and guests present. This meeting featured the Section's annual panel discussion on the physical and chemical properties of the basic plastic materials. The panel consisted of G. V. DeLaire; H. J. Kauth, Kauth & Hardy Co.; George Prall; Clarence VanEpps; and V. M. Howe, Eastman Kodak Co., with Program Chairman G. A. Peck, Stromberg-Carlson, as moderator.

In the business session, committee chairmen for the coming year were announced, as follows: program, Mr. Peck; housing, P. R. Sultzback, Jr., Stromberg-Carlson; membership, C. N. Wade, National Vulcanized Fibre Co.; publicity, Irving Copland, Monroe Plastics Co., Inc.; credentials, Mr. DeLaire; auditing, Harvey Bryans, Harco Industries, Inc.; finance, R. L. Hayes, Ontario Plastics, Inc.; nominating, H. L. Henry, Tri-Line Corp.; and election inspectors, Horace Lloyd, Eastman Kodak Co.

Engineering Aspects of Adhesives

A talk on "Engineering Aspects of Adhesives," by Fred Wehmer, Minnesota Mining & Mfg. Co., featured the January 28 meeting of the Cleveland-Akron Section, SPE. The meeting, held at Miller's Colonial Restaurant, Cuyahoga Falls, was attended by 32 members and guests.

Mr. Wehmer discussed some of the fundamental principles involved in adhesive problems, using typical examples to illustrate each point. He pointed out that an adhesive may be relatively good in tensile strength, but poor in shear strength, and it is therefore always advisable to select adhesives on the basis of the specific requirements for each application. The speaker also described his company's wartime development of a cement, based on nitrile rubber, for bonding aluminum to itself. In the question period following the talk, the subject of adhesives for polyethylene was discussed.

Results of the election of officers for the Section were announced in the business session, as follows: president, Richard L. Huber, Hercules Powder Co.; vice president, Clayton F. Waterfield, Bird Electronics Corp.; treasurer, Ward T. Van Orman, Goodyear Tire & Rubber Co.; and secretary, M. W. Osborne, Jr., B. F. Goodrich Chemical Co. Directors of the Section include the officers, C. F. Saurwein, Goodyear, W. F. Anderson, Goodrich Chemical, H. E. Buecken, National Rubber Machinery Co., and R. A. Rybak and E. W. Johnson, both of Plastic Engineering, Inc. The following committee chairmen were appointed: program, Mr. Anderson; house, F. C. Hays, Chemical Rubber Co.; membership, F. W. Steere, Jr., Goodrich Chemical; publicity, Bertha Wellman; educational, Hugh Winn; historical, A.R. Morse, Reed-Prentice Corp.; credentials, Mr. Johnson; and finance, Mr. Van Orman.

Other business conducted at the meeting included the presentation of the Section award to Mr. Morse for his prize winning paper, "Empirical Factors in Injection Machine Design," and a report by M. S. Moulton, Goodrich Chemical and SPE national director, on the national conference in January.

Turnbull on Merchandising Plastics

The February 9 joint meeting of the Chicago Section, SPE, and Midwest Chapter, SPI, held at the Builders' Club, Chicago, Ill., featured a talk on "Plastics Merchandising Grows Up" by James R. Turnbull, general sales manager, plastics division, Monsanto Chemical Co. Mr. Turnbull stated that the role of the raw material supplier is extremely vital to the success of the plastics industry and accounts for the interest which suppliers have shown in advertising the important contributions of the industry. Glamor and novelty have been stressed too much in describing plas-

tics to businessmen and consumers, the speaker declared. Emphasis should instead be placed on the utility, economy, superior properties, and ability of plastics to do a job which no other material can do. In this connection, Mr. Turnbull said that some molders and fabricators try to sell "plastics," when they should be selling a specific product with specific advantages, such as brighter colors, better electrical properties, higher impact strength, etc. The speaker concluded by outlining Monsanto advertising plans designed to sell the advantages of plastics in better properties, lower cost, and more eye appeal than is available in other materials.

Three Speakers at California Meeting

Approximately 83 members and guests of the two groups attended a joint dinner meeting of the Southern California Section, SPE, and Pacific Coast Section, SPI, on February 3 at Rudi's Italian Inn, Los Angeles. The technical session consisted of three talks: "Raw Materials and Catalysts Required for Polyester Resins," by John Bond, Pittsburgh Plate Glass Co.; "New High-Speed Alkyd Molding Compound," by Al Young, C. D. LaMoree Co.; and "Methods of Evaluating Glass Cloth-Polyester Laminating Techniques," by Milton Brucker, Zenith Plastics Co. The session was presided over by Elbert Davis, American Extruded Products Co. and chairman in charge of arrangements.

Mr. Bond discussed the general nature and composition of polyester-type resins, which may be classified as having either short or long tank life, depending on degree of polymerization. This polymerization takes place in four steps: (1) soft gel; (2) rigid gel; (3) complete cure; and (4) post cure; and the last step is necessary to obtain maximum abrasion resistance and highest heat distortion point. The speaker then described the requirements for a polyester resin catalyst and discussed the various types of catalysts in use and their effect on the resin polymerization reaction.

Mr. Young's talk covered the new Plaskon 420 alkyd molding material that can be cured completely in 15 to 30 seconds. Despite the use of asbestos and clay fillers the compound does not give much mold wear. The compound, available in colors approved for electrical materials, is finding wide application in the electrical field. It can be used advantageously where large production in a short time is wanted with a minimum investment in molds.

Mr. Brucker, who dealt with low-pressure laminating from the viewpoint of the manufacturer, said that before going into production the manufacturer should determine whether he can produce by this method products better or cheaper than competitive ones made by other techniques or materials. Necessary planning for low-pressure laminating must consider the factors of design, tooling, and molding techniques. With respect to design, the article must be laid up easily; preforms must be used if possible; the mold must have no reverse drafts or tapers; and there must be no extra handling of component parts. Tooling is determined by quantity, since vacuum bags are suitable for small runs, but metal molds are needed for large runs and improved quality. In the molding operation both parting compounds and catalysts may vary with the piece being molded, and a resin having quick gellation should be used.

New officers of the SPE group were announced at the business session, as follows: chairman, John Delmonte, Plastic Industries Technical Institute; vice chairman, Paul Rodriguez, *Pacific Plastics*; secretary, Warren V. Prince, consultant; and treasurer, D. N. Beauchamp, North American Aviation, Inc. Mr. Prince also received an award from the Section for his paper, "Basic Laws of the Plastic Molding Process," which tied for third prize in the 1948 SPE Prize Paper Contest and which will be published in a future issue of India RUBBER WORLD.

Upper Midwest Section Names Officers

The Upper Midwest Section, SPE, has announced the election of the following officers and directors for 1949: president, J. L. Formo, Minneapolis-Honeywell Regulator Co.; vice president, E. W. Ulrich, Minnesota Mining & Mfg. Co.; secretary-treasurer, L. E. Erickson, Commercial Plastics Co.; assistant secretary-treasurer, Miss L. K. Polzin, Minneapolis Chamber of Commerce; and directors, E. W. Anderson, Minneapolis Plastic Molders, Inc., P. W. Felt, Brown & Bigelow, Fulton Holtby, University of Minnesota, A. G. Hovey, General Mills, Inc., T. W. Ingersoll, Plastics, Inc., J. H. Kugler, Minnesota Mining, William Mahle, Northwest Plastics, Inc., S. K. Moxness, Minneapolis-Honeywell, and S. J. Sultany, Telex, Inc.

The following committees were appointed: membership—Mr. Erickson (chairman), Mr. Hovey, and Mr. Kugler; program—Mr. Moxness (chairman), and Messrs. Felt, Holtby, and Kugler; professional activities—D. H. Chambers, Minneapolis-Honeywell, (chairman); monthly bulletin—Mr. Ulrich; and hospitality—A. G. Morrison, Product Engineering & Development Co.

The Section meets on the second Monday of each month at Coffman Memorial Union, University of Minnesota, Minneapolis, Minn. On March 14, T. N. Willcox, General Electric Co., will speak on "New Developments in Plastics." On April 11, tentative plans call for R. W. Van Sickle, Dow Chemical Co., to discuss "New Thermoplastics at Dow." The May 9 meeting will feature the presentation of the first prize paper in the recent SPE Prize Paper Contest, "Empirical Factors in Injection Molding Machine Design," by A. R. Morse, Reed-Prentice Corp.

Responsibility for Mold Design

The Western New England Section, SPE, held its first dinner-meeting of the year on January 5 at the Hotel Sheraton, Springfield, Mass. Subject of the meeting was "Responsibility for the Design of Molds." C. W. Coe, Shaw Insulator Co., discussed the subject from the molder's point of view; while John Mallory, Parker Stamp Works, considered the mold designer's and mold maker's viewpoint.

Both speakers were in agreement as to the function and responsibility of the two groups represented and concurred in the opinion that the molder should be responsible for the design of the mold; while the mold maker should be responsible for meeting specifications and blueprint details as well as proper mechanical functioning of the mold. It was noted that the mold maker could quite often be of great assistance to the molder by pointing out more efficient or simpler methods of mold construction which would save considerable time and money in fabrication of the mold without affecting molding efficiency. Such changes should be made only with the full knowledge and approval of the molder. Both speakers also emphasized that the material supplier should not be expected to design either parts or molds, but can often offer assistance in certain cases because of his general knowledge.

Wilson Addresses South Texas Section

The South Texas Section held a dinner-meeting January 26 at the Ben Milam Hotel, Houston. Approximately 20 members and guests heard James S. Wilson, manager of plastic machinery sales, Watson-Stillman Co., speak on "Injection Molding Machines and Methods." He advocated greater attention to product design and promote more efficient production. Illustrating the effect of product and mold design upon production, the speaker gave examples of both good and bad designs of runners and gates and showed the results of poor gating upon the molding cycle and finished product.

New Flexol Grades

FLEXOL PLASTICIZER DOP is now available in two grades with greatly improved color, it was announced by Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. New plasticizer facilities at Institute, W. Va., have made it possible to produce practically colorless DOP, of particular advantage in compounding clear transparent plastics.

The two new grades of DOP include one having a maximum A.P.H.A. color of 100, suitable for non-electrical uses; and the other, DOP-150, for electrical applications has a resistivity over 2×10^5 megohms/cm., power factor under 4%, and maximum A.P.H.A. color of 150. Flexol DOP is widely used with vinyl resins because of its excellent compatibility, permanence, and good low-temperature flexibility characteristics.

SPI Appoints MacHale

THE appointment of William H. MacHale as chairman of the public relations committee of the Society of the Plastics Industry, 295 Madison Ave., New York 17, N. Y., has been announced by Society President George H. Clark, Formica Co. Mr. MacHale has served on this committee for several years and headed the special publicity committee set up for the 1948 National Plastics Exposition. He also has been associated with American Cyanamid Co. for 15 years and now is sales promotion and advertising manager. Other members of the public relations committee are Don Masson, Bakelite Corp.; John Sasso, *Business Week*; J. H. Thomas, Owens-Corning Fiberglas Corp.; J. A. Jackovics, Columbia Protektosite Co., Inc.; Ralph David, *Pacific Plastics*; R. L. Gibson, General Electric Co.; R. T. Zintl, E. I. du Pont de Nemours & Co., Inc.; and M. A. Brown, Jr., Plaskon Division, Libbey-Owens-Ford Glass Co.

William T. Cruse, SPI executive vice president, was one of the principal speakers at the semi-annual meeting of the Fountain Pen & Mechanical Pencil Manufacturers' Association, Inc., on January 18 at the Statler Hotel, New York, N. Y. Mr. Cruse spoke on "Plastics in the Manufacture of Fountain Pens and Mechanical Pencils," pointing out the close relation between the two industries. The speaker reviewed the history of plastics in fountain pens and mechanical pencils and declared that the plastics industry will continue to make developments in accordance with the pen industry's needs.

Scientific and Technical Activities

Harris Addresses L. A. Group

APPROXIMATELY 190 members and guests of The Los Angeles Rubber Group, Inc., on February 1 at the Hotel Mayfair, attended a meeting which consisted of an afternoon technical session, followed by a cocktail hour and dinner. Featured speaker at the technical session was Tedd B. Harris, general manager and chief engineer, United Welding & Mfg. Co., who discussed "A New Principle in Pressure Equipment."

Mr. Harris described the development of the Harris quick-opening safety door, which differs from ordinary pressure or vacuum doors in that the sealing mechanism is a bearing mounted, free moving, rotating lugged ring which interlocks a series of wedges. The door has no threaded parts and requires no wrenches or special tools to open or close; yet it bears equally at all points and can close against any type of gasket, whether rubber or metal. The remainder of the talk was devoted to a description of a 43-foot long tank, 12½ feet in diameter, designed and built by United Welding for Firestone Tire & Rubber Co.; the door of this tank can be opened in less than 35 seconds.

After dinner Norman I. Jacoby and Edward H. Gibbons, of *Alert* newsletter, spoke on "Communistic Agitation and Propaganda and Its Effect on You." The speakers gave a factual talk on Communist literature being distributed in America, methods of operation of the Communists, and the manner in which they control organizations. Charles A. Lamb, Sr., Lamb Rubber Co., also spoke briefly on his impressions of England as gained in a recent trip.

New officers and directors of the Group were announced at the business session, as follows: chairman, C. H. Churchill, Sterling Rubber Products, Inc.; associate chairman, E. C. McLaughlin, H. M. Royal, Inc.; vice chairman, R. D. Abbott, R. D. Abbott Co.; secretary, A. J. Hawkins, Jr., E. I du Pont de Nemours & Co., Inc.; assistant secretary, F. C. Johnston, Caram Mfg. Co.; treasurer, L. E. Budnick, Ohio Rubber Co.; assistant treasurer, A. J. Falkenburg, American Mineral Spirits Co.; and directors, P. W. Drew and C. S. Hoglund, both of Goodyear Tire & Rubber Co., R. L. Short, Kirkhill Rubber Co., and D. C. Maddy, Harwick Standard Chemical Co.

The following committee chairmen were appointed: auditing, L. D. Snow, Fullerton Mfg. Co.; current events, C. R. Wolter, Witco Chemical Co.; golf, A. H. Federico, C. P. Hall Co.; membership, R. D. Zirker, Shell Chemical Co.; prize, F. A. Thistle, Typrene Roller Co.; reception, J. A. Knudson, Kirkhill; technical, H. R. Erwin, Goodyear Synthetic Rubber Corp.; and yearbook, C. L. Towers, Shell Oil Co.

Other business conducted included reports from the new committee chairmen, R. E. Bitter, B. F. Goodrich Chemical Co. and chairman of the 1949 yearbook committee, announced the distribution of the new yearbook and received a vote of thanks from the membership for his work. The drawings for door prizes donated by the Group were won by Mr. Abbott; Harold Sears, Stillman Rubber Co.; Y. Van Patter, Caram Mfg.; M. Montgomery, Martin, Hoyt & Milne, Inc.; and J. E. Toews, Shell Chemical.

Statex K "Cold Rubber" Processing and Road Tests

THE results of recent road tests on 6.50 by 15 "cold rubber" (low temperature GR-S) tires made with VFF natural gas carbon black, Statex K, and points of special interest in the processing of this black in cold rubber were announced in late February by Columbian Carbon Co., New York, N. Y.

Tested at 60 miles per hour and 20% overload, at 26,000 miles, tires were wearing at the rate of 124 miles per mil, and at that mileage 40% of the original non-skid portion of the tire tread still remained.

Tread stocks were run at full production rates without processing troubles. Dump temperatures of 375° F. for the initial mix showed no scorch and proved beneficial to modulus. These effects are ascribed to improved surface properties of the fine natural gas carbon, Statex K. The delay in carbon-gel formation (scorch) of Statex K masterbatches, considered due to the reduced adsorption activity of this fine furnace carbon for oxygen, provides a safety margin within which it is possible to process at higher temperatures. With Statex K, stock temperatures normal for synthetic rubber treads provide desired modulus for maximum wear without the penalty formerly exacted in short elongation, in flex crack growth, and in unfavorable aging under storage.

Columbian Carbon believes that Statex K, a carbon black of balanced properties, requiring no unusual and costly processing or compounding changes to develop maximum wear and flex life in "cold rubber" tires, will give the "cold rubber" program the same fillip that Statex 93 (HMF) gave the GR-S program in the war years.

Crossley Honored

M. L. CROSSLEY, a director of research for Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., was elected an honorary member of the American Institute of Chemists in recognition of his work in the field of chemistry. Presentation of the membership was made at a joint meeting of the New Jersey Chapter, A. I. C., and the North Jersey Section, A. C. S., on February 14 at the Hotel Winfield Scott, Elizabeth. August Merz, research adviser and consultant for American Cyanamid, presented Dr. Crossley to Lawrence H. Flett, A. I. C. president, who made the award. Dr. Crossley won the 1947 gold medal of the A. I. C. and has twice been president of the Institute.

Ontario Group Has Film Night

APPROXIMATELY 40 members and guests of the Ontario Rubber Section, C.I.C., attended the annual "Film Night" on February 8 at the University of Toronto, Toronto, Ont., Canada. Several films were shown through the courtesy of Hiram Walker & Son, Ltd. These included sports shorts and a feature film, "Keeping Nature on Its Course," which depicted the operations of a modern distillery.

Catton on Processing Neoprene

THE Connecticut Rubber Group held its winter meeting February 11 at the Hotel Barnum, Bridgeport. Two talks were featured at the meeting: N. L. Catton, E. I. du Pont de Nemours & Co., Inc., spoke on "Processing Characteristics of Neoprene"; and Michael MacDougall, "The Card Detective," described and illustrated the methods used by professional gamblers to fleece the unwary.

Mr. Catton discussed the properties of neoprene in general and described in detail the factory handling of the general-purpose types GN and GN-A. A new member of the group, Neoprene Type RT, was described by the speaker as possessing raw stock stability and curing characteristics comparable to Type GN-A. Unlike types GN and GN-A, Type RT does not freeze and become leathery in the uncured state and therefore retains its tackiness and building characteristics to a greater degree. Type RT vulcanizates possess very great resistance to crystallization, thus eliminating the need of sulfur and long cures to retard crystallization. The new neoprene is non-discoloring and can therefore be substituted for Type GN in all light-colored products.

The speaker then presented data demonstrating the effect of warehouse storage on plasticity, scorch, and curing characteristics of these three general-purpose neoprenes. Some interesting data on the use of Para-Flux to retard uncured stock freezing and crystallization were discussed. The best conditions for the breakdown of neoprene are on a cold mill in the absence of chemical plasticizers, Mr. Catton pointed out. The importance of proper mixing and its effect on subsequent processing operations, such as tubing and calendering, were also emphasized. The use of Neoprene Type S to overcome the softness imparted by high plasticizer concentrations was also described.

Bruson Discusses Polymers

APPROXIMATELY 120 members and guests of the Thiokol Technical Club attended a meeting on February 14 at Thiokol Corp., Trenton, N. J. Speaker of the evening was Herman Bruson, Industrial Rayon Corp., whose topic was "The Chemistry of Some Unusual Olefinic Polymers." The speaker was introduced by H. B. Walker, E. F. Houghton & Co.

Dr. Bruson began with a discussion of the reaction of crotonaldehyde with potassium acetate in the presence of acetic anhydride, with subsequent polymerization in the presence of morpholene resulting in the formation of a polymer containing acetylated side groups. This yields a polymer having conjugated double-bonds which is capable of a type of vulcanization by the use of amines of certain sodium salts. The major portion of Dr. Bruson's talk was devoted to cyclopentadiene polymers and products derived therefrom. Although mainly theoretical in nature, the talk included the preparation of a large number of cyclopentadiene reaction products, some of which appear of interest as drying oils.

Rubber Division Meeting

FURTHER details of the meeting of the Division of Rubber Chemistry, A. C. S., to be held at the Hotel Statler, Boston, Mass., May 23 to 25, were given in a letter to the members, under date of February 10, by C. R. Haynes, Binney & Smith Co., secretary of the Division.

The first technical session will start at 2:00 p.m., Monday, May 23, with the morning of that day being used for registration. Besides the usual broad range of subjects to be discussed, the papers committee wishes to give particular emphasis to developments in the low-temperature polymer field and plans a symposium on this subject at one of the technical sessions. Abstracts outlining the subject matter of the papers were due at the office of the secretary on March 15 and will be published in the April issue of India RUBBER WORLD. Since this Division meeting is separate from that of the parent Society, a card was enclosed with this February 10 letter to the members for use in obtaining abstracts of the papers given before the 1949 regular meeting of the A. C. S. Copies of the abstracts of the Rubber Division Boston meeting papers will also be available at the meeting in addition to their publication in the rubber trade journals.

Also of special interest at this meeting will be the Charles Goodyear Lecture to be delivered by Harry L. Fisher, of U. S. Industrial Chemicals, Inc.

James C. Walton, Boston Woven Hose & Rubber Co., is chairman of the local committee on arrangements, and he and his committee plan several interesting innovations for this meeting, including an old-fashioned clam bake at a nearby seashore resort, Monday evening, and visits to various manufacturing plants in Greater Boston on Tuesday afternoon.

The 25-Year Club will hold a luncheon Monday noon under the chairmanship of John M. Bierer, Boston Woven Hose.

A suppliers' cocktail party under the chairmanship of Owen J. Brown, Jr., Godfrey L. Cabot, Inc., is scheduled for Tuesday evening preceding the Division banquet. The banquet itself is set for 7:00 p.m.

Special activities are also planned for ladies visiting Boston with members, and the ladies also will be welcome at the banquet.

Cox Discusses Rubber Engineering

APPROXIMATELY 100 members and guests of the Southern Ohio Rubber Group attended a dinner-meeting February 17 at the Y.M.C.A. Auditorium in Dayton. Featured speaker was R. G. Cox, sales manager of molded and extruded mechanical goods for The B. F. Goodrich Co., whose topic was "Engineering with Rubber."

Mr. Cox dealt with the different types of rubber products and their methods of manufacture, comparing GR-S types with neoprene and natural rubber. Following the talk was a short discussion period during which Mr. Cox commented on the problems of the rubber industry from the viewpoint of the sales department. The meeting concluded with a showing of the sound-color motion picture, "Portrait of an Industry," presented through the courtesy of Calco Chemical Division, American Cyanamid Co.

The business session preceding the talk was called to order by retiring Chairman R. S. Radow, Inland Mfg. Division of General Motors Corp. Following a report from the treasurer, H. H. Wolfe, Dayton Rubber Co., the new officers of the Group were announced, as given on page 615 of our February issue. The meeting was then turned over to the new chairman, James L. Fitzgerald, Premier Rubber Co., who gave a short inaugural address.

The Group's next meeting will be the annual summer outing and golf session, tentatively scheduled for either May 21 or June 4. The final date and the meeting place will be announced soon.

New Hydrocarbon Samples

SIX new NBS standard hydrocarbon samples have been announced by the National Bureau of Standards, bringing to 156 the number of such compounds now available for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. These samples have been prepared as part of a cooperative program of the Bureau and the American Petroleum Institute, begun in 1943. They follow:

NBS Sample No.*	Compound	Amount of Impurity,† Mole %	Unit Volume,‡ Ml.
502-5S	n-Undecane	0.04±0.03	5
503-5S	1-cis-3-pentadiene	0.08±0.04§	5
504-5S	1-trans-3-pentadiene	0.08±0.03§	5
505-5S	1,4-pentadiene	0.07±0.03§	5
506-5S	1,3-dimethyl-5-ethylbenzene	0.11±0.06	5
507-5S	cis-decahydronaphthalene (cis-bicycle-4,4,0-decane)	0.11±0.05	5

*The designation "5S" indicates a sample of five ml. sealed "in vacuum" in a special pyrex glass ampoule with internal "break-off" tip.

†Purity evaluated from freezing point measurements, as described in *J. Research NBS*, 35,355 (1945), WP1676.

‡Tolerance approximately ±10%.

§Polymer formed while sealed may be removed as residue by simple vaporization of the sample "in vacuum" at an appropriate temperature.

Instructions for transferring standard samples of hydrocarbons "in vacuum" are available upon request. A complete list of NBS standard samples of hydrocarbons, together with instructions for ordering, may also be obtained from the National Bureau of Standards, Washington 25, D. C.

Cadwell Addresses SAE Section

SPEAKING before the Virginia Chapter of the Society of Automotive Engineers at Richmond on February 14, S. M. Cadwell, director of research and development for United States Rubber Co., stated that recent improvements in synthetic rubber, rayon, and nylon had enabled man-made materials to gain ground in competition with the natural products.

"Synthetic rubber has been improved to the point where it is now good enough to hold its own with natural rubber in many respects," Dr. Cadwell said. "Moreover it is superior to the natural product for certain specialized uses."

After a description of the uses of GR-S, Butyl, neoprene, and nitrile rubbers, Dr. Cadwell also cited the work done with synthetic fibers, notably rayon and nylon. Basically, the use of rayon cord permits stronger yet thinner and lighter plies which result in cooler running tires. Nylon cord provides stronger airplane tires capable of carrying heavier loads with much less danger of blow-outs during landings.

Calendering a Major Topic

THE first meeting of the year of the Chicago Rubber Group took place on February 4 at the Morrison Hotel, Chicago, Ill. Approximately 200 members and guests attended the meeting, which consisted of an afternoon technical session, followed by a cocktail hour, dinner, and a program of entertainment. Herman Boxser, Acadia Synthetic Products Division, Western Felt Works, presided over the technical session which consisted of two talks: "New Equipment for Precision Calendering," by G. V. Kullgren, Adamson United Co.; and "Instrumentation in the Rubber Industry as Applied to Fine Calendering," by N. R. Stilwell, Foxboro Co.

Mr. Kullgren described the operation of early-day calenders in the rubber industry and contrasted them with modern equipment, showing how developments and refinements in design have resulted in improved quality and increased productivity. The economies obtained with new equipment justify their purchase, the speaker stated, using as an example the reduction in average thickness of double-coated tire fabric by only 0.001-inch by improving the calendering process to give a material saving alone approximating $1 a minute a calender. Mr. Kullgren's paper will be published in a future issue of India RUBBER WORLD.

Mr. Stilwell described the use of three modern instruments for the rubber industry: the Varigraph recorder for weighing rubber sheets continuously; the Bureau of Standards contact disk thermocouple; and the Dynalog temperature controller. The Varigraph recorder electronically measures the weight of a sheet passing through two fixed plates. It can be set for the desired thickness or weight of sheet and will indicate variations as low as 0.001-inch. With engraved or irregular stocks the instrument gives the average thickness.

The Bureau of Standards contact disk thermocouple operates by balancing the effect of heat on two thermocouples, one near an auxiliary heater, and the other on the calender roll. An accuracy of ±2° F. is possible using modern refinements, including a very small roll surface temperature heat having small contact area. The Dynalog electronic temperature controller is available in two types, voltage activated and resistance activated. This instrument detects and magnifies temperature unbalance and measures six variables on six curves with only one pen arm.

After dinner M. J. O'Connor, C. P. Hall Co., spoke briefly on the directory which the Group plans to issue this spring. The attendance then saw color films of the 1949 Tournament of Roses and Rose Bowl game. Bob Voights, head coach of Northwestern, gave a play-by-play description of the game during the film and described some of the game highlights. Group members Ralph Anschuetz, Witco Chemical Co., and Jay Berwanger, Hood Sponge Rubber Products Co., who acted as head linesman and referee, respectively, at the game also spoke briefly on their experiences.

Natural Rubber from Socfin

SOCFIN CO., LTD., Kuala Lumpur, British Malaya, has announced the development of special grades of natural rubber: "Tensorub" T, a high tensile strength and high tear and abrasion re-

sistant type noted for its constant characteristics in cure and other properties; and "Plastorub" A and B, improved grades also with high tensile strength and low plasticity. Studies started in 1936 with the object of preparing improved grades of natural rubber with less variable characteristics have now resulted in natural rubber with interesting new properties. In England and on the Continent these new grades have been very well received, and two of the larger American rubber goods companies are at present conducting tests on a commercial scale.

"Tensorub" T is prepared in a manner which retains most of the naturally occurring accelerators and antioxidants and therefore has excellent vulcanization and aging characteristics, it is claimed. It is emphasized that tensile strength values are as high as the maximum for 1X ribbed smoked sheets and in addition are more constant at this higher level than the RSS. Rate of vulcanization and other properties are constant with all shipments. Owing to present commitments with European companies and two companies in the United States, delivery of this type cannot be guaranteed before July, 1949, but a sample shipment is expected in May.

"Plastorub" rubber is prepared according to a method devised by the Rubber Research Institute of Malaya, for which patent application has been made. It is a soft grade of plantation sheet rubber manufactured by Socfin by the direct addition of a rubber peptizing agent to latex, followed by a carefully controlled period of heating during the drying of the wet sheet after coagulation. It is therefore possible to prepare this rubber in various degrees of plasticity, and the A type is the normal production having a Mooney value at 100°C. of 50. "Plastorub" B has a Mooney value of 60. Both types are suitable for immediate compounding without further breakdown. Other advantages claimed for this special rubber are faster extruding and calendering, reduced power consumption on mixing permitting lower and more constant mill roll temperatures, and more attractive and more uniform appearance of finished rubber products.

"Plastorub" is a soft rubber and therefore masses into a compact block on storage. Packaging has therefore received particular attention, and this type is shipped in special rectangular plywood chests with metal straps.

"Plastorub" A for the first quarter of 1949 will be sold at 22½¢ a pound, f.o.b., New York, and the B type at 22¢ a pound. No price has been established for "Tensorub," but it is stated that it will be lower than those for "Plastorub."

Further information on these special grades of rubber and more complete technical data may be obtained from F. Chevassus, technical representative of Socfin Co., Ltd., 200 W. 58th St., New York, N. Y.

CALENDAR

Mar. 1-31.	1949 Annual Red Cross Fund Appeal.
Mar. 17-19.	West Coast Chapter, SPI. Annual Conference, Santa Barbara, Calif.
Mar. 22.	Washington Rubber Group.
Mar. 22.	Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.
Mar. 25.	Chicago Rubber Group, Hotel Morrison, Chicago, Ill.
Mar. 25.	Boston Rubber Group, Somerset Hotel, Boston, Mass.
Mar. 25.	Buffalo Section, SPE. Westbrook Hotel, Buffalo, N. Y.
Mar. 25.	Cleveland Section, SPE.
Mar. 25.	New York Rubber Group, Henry Hudson Hotel, New York, N. Y.
Mar. 27-Apr. 1.	American Chemical Society, National Meeting, San Francisco, Calif.
Apr. 5.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Apr. 6.	Western New England Section, SPE. Hotel Sheraton, Springfield, Mass.
Apr. 7.	Southern California Section, SPE.
Apr. 11-13.	SAE. Aeronautical & Transport Meeting, Hotel New Yorker, New York, N. Y.
Apr. 11.	Upper Midwest Section, SPE. University of Minnesota, Minneapolis, Minn.
Apr. 12.	New York Section, SPE. Hotel Sheraton, New York, N. Y.
Apr. 13.	Newark Section, SPE. Newark AC, Newark, N. J.
Apr. 13.	Rhode Island Section, SPE.
Apr. 15.	Akron Rubber Group, Mayflower Hotel, Arkon, O.
Apr. 19.	Philadelphia Section, SPE.
Apr. 19.	Rochester Section, SPE.
Apr. 20.	South Texas Section, SPE.
Apr. 22.	Buffalo Section, SPE. Westbrook Hotel, Buffalo, N. Y.
Apr. 26.	Washington Rubber Group.
Apr. 29.	Cleveland Section, SPE.
May 3.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
May 6.	Buffalo Rubber Group, Joint Meeting with Ontario Rubber Section, C.I.C. Niagara Falls, Ont., Canada.
May 9.	Upper Midwest Section, SPE. University of Minnesota, Minneapolis, Minn.
May 18.	South Texas Section, SPE.
May 20.	Chicago Rubber Group, Hotel Morrison, Chicago, Ill.
May 23-25.	Division of Rubber Chemistry, A. C. S. Hotel Statler, Boston, Mass.
June 10.	Rubber Division, C.I.C. Regional Conference, Royal Connaught Hotel, Hamilton, Ont., Canada.
June 17.	Akron Rubber Group, Summer Outing.

New Name for Perbunan

ENJAY CO., INC., 15 W. 51st St., New York 19, N. Y., has adopted a new name, Paracril, for the Perbunan nitrile rubbers it sells. The new name ties in Enjay's rubbers with the family of Para petroleum-derived chemicals sold by the company. Paracril will be sold in the following grades, corresponding to the previous Perbunan designations: 18-80, 26NS60, 26NS90, and 35NS90.

Coincident with the new name the company announced a color code system for identifying the various Paracril grades. All bags of Paracril shipped will carry the following color code designations: 18-80, green; 26NS60, blue; 26NS90, yellow; and 35NS90, red.

Technical Service on Butyl Discontinued

Effective February 15, Enjay discontinued all technical service on GR-I, or Butyl rubber. The company still continues operation of the government plants which were designed and built under the supervision of the Standard Oil Co. of N. J. during the war period.

It is understood that discussions within the government have been taking place regarding possible reductions to be made in the Butyl rubber mandatory use pattern. Defense authorities, from a security standpoint, are opposed to working fewer than two plants, while RFC has maintained that operating two plants on a considerably reduced output basis is uneconomical.

Whalley Discusses Cotton

THE Northern California Rubber Group held a meeting on January 27 at the Hotel Claremont, Berkeley, sponsored by California Cotton Mills Co., and attended by 47 members and guests of the Group. The speaker of the evening, Walter Whalley, general superintendent of the cotton company, was introduced by W. J. Talbot, company vice president and sales manager.

Mr. Whalley discussed the processing of cotton, using a motion picture to illustrate the operations involved from the original picking of the cotton to the final weaving into fabrics. The speaker stated that cotton is the most important material in the textile industry and described the various sources of cotton. Mr. Whalley noted that California cotton was equal to the finest cotton grown in the United States and that the state holds the record for the highest yield of cotton per acre. Table favors consisting of twine kits were also distributed by California Cotton Mills.

Boston Group Ski Party

OVER 30 members of the Boston Rubber Group participated in a ski outing to Mount Ascutney, Windsor, Vt., February 11 to 13. The Juniper Hill Inn served as headquarters, and most of the Group arrived February 11. Saturday was spent skiing on the recently developed areas on Mount Ascutney; while the non-skiers in the Group went up to Hanover, N. H., to watch the ski jumping at the Dartmouth College Winter Carnival. On Saturday night the entire group was the guest of Goodyear Tire & Rubber Co. at a cocktail party preceding a buffet supper. A final skiing party was held Sunday morning. The ski outing was so successful that it was unanimously voted to attempt to make it an annual affair. Arrangements for the outing were made by a committee consisting of A. W. Bryant, Binney & Smith Co., W. S. Edsall, Windsor Mfg. Corp., and D. D. Wright, Hood Rubber Co.

Beetle Prices Reduced

PRICE reductions in its black and brown Beetle urea molding compounds have been announced by American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., effective January 27. The new prices, per pound, follow: less than one drum, 26.50¢; one drum to less than truckload, 16.75¢; and truckload or carload and up, 16.25¢. The material is sold f.o.b. cars, Wallingford, Conn., with minimum freight allowed in the United States to carrier's station nearest buyer's destination on shipments of one or more standard containers.

RUBBER WORLD
NEWS of the MONTH

Belt Railroad 130 Miles Long Planned in Ohio; More Comments on Industry Outlook Made by Management

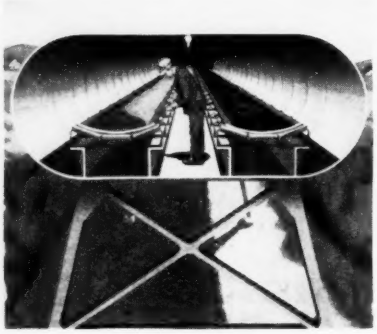
A new and revolutionary approach to the bulk transportation of coal and iron ore in the State of Ohio involving the use of 267 miles of rubber belting estimated to cost $38,000,000 was announced by H. B. Stewart, Jr., president of the Akron, Canton, & Youngstown Railroad Co., in Cleveland on February 10. Harry E. Humphreys, Jr., president of United States Rubber Co., predicted continued expansion and business in the rubber industry, but asked that the government get out and stay out of the rubber business in the near future. P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., predicted some slowing down of general business activity in the near future since the backlog of orders even for industrial rubber goods is being reduced. The United States Department of Commerce reported rubber industry sales for 1948 valued at $3,549,000,000 as compared with $3,528,000,000 in 1947. Year-end inventories for 1947 and 1948, respectively, were valued at $535,000,000 and $629,000,000 It was indicated that the natural rubber producers may present a united front for a rubber regulation scheme at the meeting of the Rubber Study Group in London late in March. The URWA union has decided on a bargaining program for 1949 to include a wage increase demand of 25¢ an hour and possibly a pension plan and health and welfare program to be paid for by the rubber companies.

130-Mile Belt Railroad Planned

Formation of a new corporation, the Riverlake Belt Conveyor Lines, Inc., to build a $210,000,000 overland belt conveyer transportation system between Lake Erie at Lorain, O., and the Ohio River at East Liverpool, was announced last month, by Mr. Stewart. The elevated, two-way conveyer line was described as "the railroad of tomorrow—an ultra-modern method of transporting bulk cargo in volume," and it was asserted that the system would save from $20,000,000 to $45,000,000 annually in freight rates on iron ore, limestone, and coal consumed by steel mills and other industries in eastern Ohio and the upper Ohio River Valley, including Pittsburgh.

The main line of the conveyer system, designed to handle bulk cargoes only, will be a two-way belt extending a distance of 103 miles from Lorain to East Liverpool. Spur lines would serve Youngstown and Cleveland, comprising a total system of 130 miles. This will be the first application of a belt conveyer to the role of common carrier, and it also will be the first belt carrier to handle the movement of bulk cargoes in two directions at the same time. Unlike any other form of transportation, the more volume handled by a belt conveyer up to its capacity, the lower the cost per ton.

Modern terminal facilities, to save valuable turn-around time for lake ore vessels, and for the handling of coal and ore on



View of Interior of Steel Gallery Showing Northbound and Southbound Belts, Service Walk, and Provisions for Maintenance and Service

the Ohio River, will be constructed as separate units of Riverlake Belt Conveyor. Another feature will be a coal washing plant which will clean and grade untreated coal enroute. These services will cost $56,000,000, leaving approximately $154,000,000 for the construction of the actual conveyer system.

Riverlake Belt Conveyor Lines will run within a completely enclosed steel gallery constructed on steel supports, 22 feet above ground level. The height of the structure will allow ample clearance of highways, railroads, farm lands, roads, and private lanes.

The conveyer's gallery, 18 feet wide, provides headroom and space for a service walk between the two moving belts. Operation of the belts will be noiseless, and the enclosed structure will eliminate dust, dirt, and spillage, it is also said.

A total of 172 belts or flights, some of them more than a mile long, will be required for the 103-mile two-way main line. Because of the terrain over the southern Ohio hills, which reach a maximum elevation of 1,280 feet above sea level at Salem Junction, a minimum of 58 separate flights of belt will be required in the first 22 miles northward from the river. In the remaining 81 miles to Lake Erie, 114 flights of belt will be used over the more level ground. On the branch spurs, 10 flights of belt will link Cleveland with the main line, and 35 flights will extend into Youngstown. Belt speed will be about 600 feet a minute, or 6.81 miles an hour.

Northbound from its Ohio River terminal, the R. B. C. system tentatively calls for the use of a 72-inch wide belt from the river to the Youngstown branch. Belting the remainder of the main route will be 60 inches wide, while a 42-inch width will be used on each of the branch spurs. A total of 267 miles of rubber belting, to cost more than $38,085,000 and composed of 243,340 feet of 72-inch belting, 887,284 feet of 60-inch belting, and 281,670 feet of 42-inch belting, will be required.

Figures for the cost of other parts of the conveyer lines are: steel structure and gallery, $55,093,025; idlers, $29,580,868; terminal pulleys, shafts, gear reducers, motors, $16,077,000; and other items, $14,253,884; total cost of conveyer system, $153,091,294.

Minimum cargo requirements have been estimated at 30,000,000 tons a year, 15,000,000 tons of coal northbound and 15,000,000 tons of ore and stone southbound. On this basis annual freight savings to industry on coal are figured at about $14,000,000 and on ore at $6,000,000.

Utilizing the same belts, but with an added power factor, the initial volume can be stepped up to 52,000,000 tons a year, consisting of 20,000,000 tons of coal and 32,000,000 tons of ore and stone. Operating at this higher tonnage rate, the potential annual savings are estimated at more than $45,380,000.

The many engineering phases of the R. B. C. Lines have reached an advanced stage in planning. Belting engineers from Goodyear, including E. W. Stephens, and engineers from Link Belt Co., and various other construction, transportation and, electrical companies have been working on the project for several months.

One of the major obstacles that will have to be overcome is the necessity of R. B. C. Lines to acquire the "right of eminent domain" since the system will have to cross railroads, and the firm will have to buy up private property in connection with the construction of the project. A bill to permit R. B. C. Lines to acquire the necessary property and right of way will be introduced into the Ohio state legislature.

The income from the sale of rubber belting in 1948 amounted to between $35 and $40 million. Belting for the R. B. C. Lines project will cost more than $38 million or about the equivalent of the 1948 production of the industry. If and when construction on this project begins, some additional belt making capacity may be required if the industry is asked to deliver the belting for the whole conveyer line in a year or less. Also, if this more or less revolutionary approach to the bulk transportation of coal and ore is successful, other projects of similar nature might be planned with the resultant very considerable increase in the demand for conveyer belting the next several years.

Humphreys on Industry Outlook

Mr. Humphreys in a talk before the Chamber of Commerce of the State of New York, in New York, N. Y., February 3, presented his company's current attitude on natural *vs.* synthetic rubber and the direction in which the rubber industry is headed.

After discussing rubber and the rubber industry before, during and since the late war, Mr. Humphreys pointed out that natural rubber will have to be constantly improved by research and development if it is to hold its own with its new man-made competitor. Synthetic rubber is here to stay, and scientists will continue to make it better and better, he said. The quality of natural rubber can be bettered, and research is being done toward that end, but whether it can be improved enough to keep pace in most respects with synthetic rubber remain to be seen.

"All that we ask is free choice to make our products of whatever material will best serve our customers at the lowest cost—if we may be forgiven for harboring such old-fashioned ideas," Mr. Humphreys stated.

This statement means that the government should get out of the rubber business at the earliest possible moment consistent with national security and stay out, he added. Emphasis was placed on complete removal of the government from the rub-

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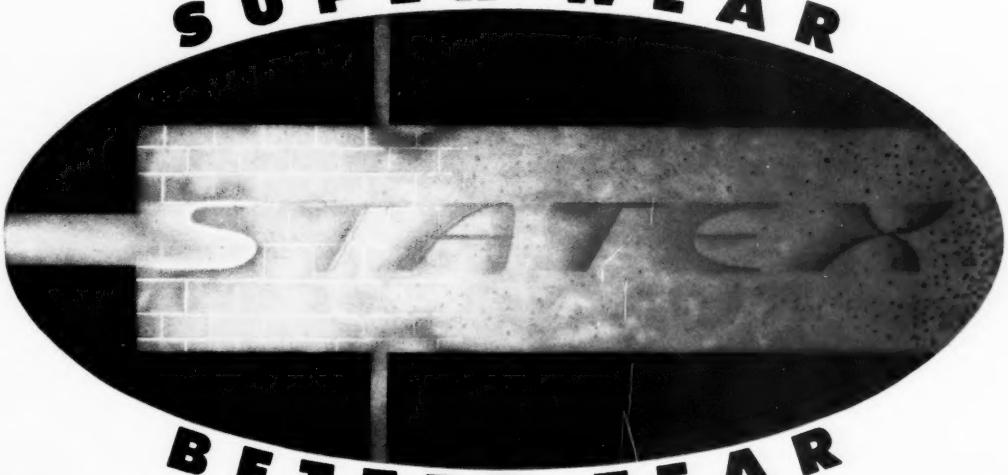

BETTER TEAR

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STATEX·B

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500 TONS OF SMOKE A DAY

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ber business because of the forthcoming Rubber Study Group meeting to be held in London beginning March 28. The meeting is scheduled ostensibly to exchange views on statistics and other problems connected with available rubber in the world, but it may well be that rubber producing countries will want to discuss plans for controlling a possible future surplus of natural rubber.

The people of the United States should realize that under the proposed International Trade Organization agreement a provision is made for controlling the quantity and the price of raw materials for the economic benefit of the people of the producing areas rather than the consuming areas. This might well lead to higher costs to rubber manufacturers in the United States for one of their basic raw materials, with resultant higher prices for the American consumer.

Mention was made of the need of prompt termination of the wartime patent pooling agreement on synthetic rubber. Agreement has been reached between private corporation signatories in the United States, but since the Canadian Government is also a signatory to the agreement, it was urged that no time be lost by our State Department in arranging for the final termination step involving the Dominion.

Disposal of the government's synthetic rubber plants to private industry under the terms of the Rubber Act of 1948 was urged, and in this connection it is hoped that the government, which showed such commendable speed in getting into the synthetic business in wartime, will not mar its record now with a lethargic departure, Mr. Humphreys declared.

With regard to the future trend of the rubber industry, it was stated that the physical volume of business, over the long term, should be greater, but that profits, either from the short- or long-term viewpoint, were dependent on the latest dispatch from Washington.

Three reasons were given for continued expansion of business in the rubber industry: the upward trend of population in the United States and the accompanying increase in per capita consumption of rubber, the continued growth of the use of motor vehicles, and the development of new products such as foam rubber, conductive rubber, etc.

Reference was made to the increase in per capita rubber consumption in the United States from less than one pound per person in 1910, to four pounds in 1920, seven pounds in 1930, 11 pounds in 1940, and finally, in 1948, to 17 pounds per person.

The rubber industry has a capacity of 100 million tires a year, and Mr. Humphreys does not believe that represents any overexpansion even though only 83 million units were produced in 1948 and about the same number are expected to be produced in 1949. In view of existing trends the extra capacity may be needed earlier than we think, it was said.

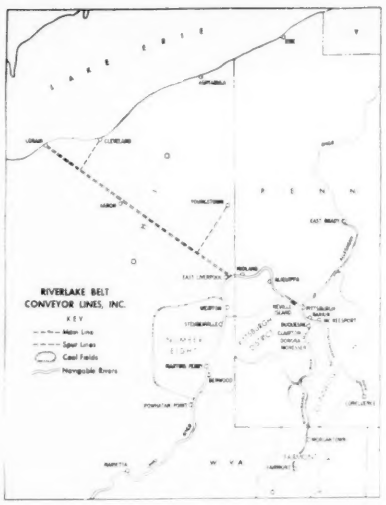
Litchfield Comments

Mr. Litchfield, in his report to Goodyear stockholders on February 15, was somewhat less optimistic than Mr. Humphreys regarding rubber industry outlook.

Mr. Litchfield informed shareholders that production of natural rubber in the Far East had expanded rapidly and now was not far from potential capacity of the plantations. This fact, combined with capacity of synthetic rubber plants, assures ample supplies of rubber in the near future.

"Our national policy is to keep synthetic plants in standby condition to produce promptly at the rate of 600,000 tons a year, not only to provide for possible interruption of peace, but not meet fluctuating changes in supply and demand. This should tend to stabilize the price of rubber and prevent wide fluctuations so detrimental to the industry in the past," he said.

"Due to the large increase in manufacturing capacity of the rubber industry during the war years, this industry was one of the first to satisfy the postwar peacetime demands for its products in the domestic market. Pipelines have been filled and inventories of manufacturers, dealers and consumers are now ample. Prospective production for 1949 will, therefore, be for current needs only. The backlog of orders for industrial rubber goods is being reduced, indicating some slowing down of general business activity in the near future," Mr. Litchfield concluded.



Map of Projected Overland Belt Conveyer Bulk Cargo Carrier to be Constructed Across the State of Ohio

Industry Production and Statistics

According to the regular monthly report of The Rubber Manufacturers Association, Inc., shipments of passenger tires during 1948 totaled 63,516,542 units, a decline of 14.3% from the peak year of 1947, when 74,109,453 tires were shipped. Production of passenger-car tires amounted to 66,780,127 units, against 1947 production of 77,795,299, and inventories were increased to 8,788,907 from 5,444,071 units at the end of 1947.

Shipments of truck and bus tires were also lower during 1948, with 14,258,140 units shipped, as compared with 17,073,911 during 1947. Production was down to 14,588,007 units, against 17,754,837 in the previous year. Inventories increased to 1,933,166 from the 1,505,221 units on December 31, 1947.

Shipments of automotive tubes during 1948 were down to 68,457,397 units, against 74,088,142 in 1947, while production of tubes amounted to 70,149,819, compared with 79,180,571 for the previous year. Inventories rose from 8,059,315 units at the end of 1947 to 9,734,490 tubes at the end of 1948.

The January, 1949, issue of the Department of Commerce publication, "Industry Survey," recorded as the estimated value of manufacturers' sales in the rubber industry for the year 1948, a figure of $3,549,000,000 as compared with $3,528,000,000 for 1947.

This same publication also included details of manufacturers' sales and inventories for the entire year 1948 by months, both on the original and index basis. The information tabulated below will supplement that given on page 230 of the November, 1948, issue of India Rubber World, where similar figures through August, 1948, were given.

Rubber Industry Manufacturers' Sales and Inventory Figures

	Sales		Inventories	
Period	Original Millions $	Index	Original Millions $	Index
1947				
Nov.	330	353	504	242
Dec.	284	307	535	257
1948				
Jan.	261	282	563	271
Feb.	268	286	587	283
Mar.	283	252	628	302
Apr.	289	312	610	293
May	294	317	615	296
June	316	342	614	295
July	314	339	600	289
Aug.	325	351	597	287
Sept.	320	345	600	288
Oct.	318	344	591	284
Nov.	306	330	600	288
Dec.	323	349	629	302

These figures supply confirmation to the previously made generalizations that the dollar value of sales during the latter part of 1948 were higher than during the latter part of 1947 and that the inventory dollar values were more noticeably higher. In the case of dollar value of inventories at the end of 1948, the increase was admittedly made up both from a greater number of units and a greater dollar value for each item. The contribution of each of these factors to the total dollar increase, however, is not available.

United States exports of rubber and rubber products were valued at $13,314,570 in December, 1948, compared with $9,833,113 in November, the Department of Commerce reported in a press release dated February 21.

The increased trade resulted from an unusual temporary accumulation of shipments and does not represent a reversal in the overall downward trend in exports of rubber and rubber products which is expected to continue, it was stated.

Exports for 1948 totaled $132,416,077, a decline of 38.3% from the record $214,515,747 reported in 1947. The 1948 total was just under the 1943 total, $133,937,814, and was substantially lower than the annual figures recorded for 1944-47. However, it was more than twice as high as that of any year prior to 1944 and was much higher than the 1935-39 average of $28,841,232.

Exports of synthetic rubber were much smaller in 1948 than in 1947. Nevertheless they averaged $305,483 a month in 1948, compared with $227,138 a month in the last half of 1947, when exports decreased sharply. Through June, 1947, GR-S was the principal synthetic rubber exported from the United States. Since that time it has been surpassed by both neoprene and nitrile type.

Exports of reclaimed rubber held up well in 1948, down only 20.4% from 1947.

Shipments of transportation items represented 59.8% of total exports in 1948, as compared with 65% in 1947. Shipments of mechanical rubber goods declined 24.5%.

The regular monthly report of the RMA stated that consumption of new rubber by manufacturers increased 7.95% during January, amounting to 87,326 long tons, compared with 80,892 tons in December. Natural rubber was used to the extent of 49,813 tons in January, against 45,644 tons in the previous month, an increase of 9.1%. The use of synthetic rubbers also increased by 6.4% over December, with GR-S amounting to 29,145 tons, neoprene 3,188 tons, Butyl 4,677 tons, and all others 503 tons.

Truck Tire Price Cutting

Price cutting in truck tires at the dealer level has been reported as having stabilized at about the bottom, with discounts ranging from about 25 to 35% off list price according to recent reports. The mail-order firms, Sears Roebuck and Montgomery Ward, first made price cuts of about 5%, and further reduction in truck tires prices also results from further quantity discounts.

It was also reported that The B. F. Goodrich Co. had cut its list prices for smaller size truck tires by about 4%. Reductions of 10-15% were then put into effect by Goodyear, U. S. Rubber, and Firestone Tire & Rubber Co., and the Goodrich prices were then revised to about the same level.

Most manufacturers and dealers see the 1949 truck tire replacement demand about equal to that of 1948, but with price cutting at the prewar level, the actual cost to buyers is only around 6% higher than in 1940-41 because of higher than prewar list prices.

The General Tire & Rubber Co., however, has raised its tire dealers' quotas 12½% above the 1948 figure according to Vice President L. A. McQueen, because business and the public are continuing active buying. January, 1949, truck tire sales will be substantially ahead of truck tire business for the same period in 1948, he said. He warned that too much confusion has been caused by public statements by pessimistic statisticians and called for a "ninety-day leave of absence" for government economists to ease recession fears.

Fair Trading by Converse Rubber

Another manufacturer of rubber products has decided to begin selling some of its products under "fair trading" procedure as soon as legal arrangements can be completed. Converse Rubber Co. announced at the National Sporting Goods Association convention in Atlantic City, in February, that a number of its top line of basketball shoes will soon be sold under fair trading.

Converse Rubber's decision to try fair trading was prompted by a desire to put an end to the price cutting epidemic which has been prevalent in the rubber sporting goods field during the past six months and which is more widespread than at any time in the last 15 years, it was said. If the company finds that the disadvantages of fair trading outweigh the advantages, it is prepared to abandon the method, but it feels that it should be given a fair trial.

London Study Group Meeting

Another meeting of the Rubber Study Group, made up of representatives of the Netherlands, Great Britain, the United States, France, and other countries interested in the production and consumption of rubber, will be held in London, England, during the latter part of March. According to Lockwood's *Rubber Report* for February 15, the American delegation may be faced with the prospect of a united producers' front involving a specific proposal that some form of regulation of production of both synthetic and natural rubber be studied by the Group with a view to arriving ultimately at an arrangement whereby both can live on an equally fair competitive basis.

A newspaper account of statements made by the chairman of the British Rubber Trade Association in London on February 16, confirms the Lockwood *Report* comment in that it was suggested that in view of the probability of a substantial surplus of rubber over the next few years, the time will be advanced when there may well be no alternative to a restriction scheme for natural rubber production, unless mandatory usage of synthetic rubber in the United States is abolished or drastically curtailed. It is hoped that the Shaier Bill (Public Law 469) will be amended to meet the changed conditions caused by the potential increase in the production of natural rubber, the chairman stated.

The 150,000- to 200,000-ton surplus estimated for 1949 may well prove too high; however, it seems likely that there will be a substantial surplus, and therefore the American stockpiling program could be completed in a considerably shorter time than originally anticipated, it was added.

One of Lockwood's correspondents, H. T. Karsten, director and manager, United Baltic Corp., Ltd., London, seems to have a somewhat different attitude in his comments on the rubber outlook. It is admitted that there is the way to meet surplus production through regulation of excessive supplies, and it is stated that it would hardly be surprising if the Americans were to agree to such a scheme more readily now that they have their own synthetic industry to take into consideration. Whether it would be quite as easy to introduce regulation in the Far East nowadays is a very different question in view of the political situation there. Restriction may be unwise from this point of view, and it might also be an umbrella under which the synthetic industry could thrive; while a lower price for natural and the resultant less easy conditions for synthetic may reduce the desirability for any rubber regulation scheme. Apparently not all natural rubber producers and dealers are completely sold on the need of a rubber regulation scheme now.

Rubber Production and Consumption

The Department of Commerce "Rubber Industry Report" for January provides facts pertinent to rubber consumption in the United States for the past and present in order to aid readers in forming their opinions regarding future consumption trends. Figures for world consumption of the new rubber, consumption in the United States and in all other countries from 1919 through 1948 are tabulated, and although the consumption trend has been upward, periods of short-term declines from 1919 to 1921, in 1925 and 1926, from 1929 to 1932, and in 1938, are emphasized. Consumption of reclaimed rubber and its percentage relation to new rubber were also listed together with consumption in transport and non-transport products.

In connection with the use of rubber in transportation items it was pointed out that the most important variable in United States rubber consumption and the key to the outlook for 1949 is the replacement demand for tires, which involves considerations of vehicle registration and scrappage, tire durability in years and mileage, changes in distributors' and consumers' stocks of tires, and use of camelback and repair materials by consumers, among the principal factors.

After data on the above-mentioned factors were presented, the durability of passenger tires was discussed at some length. Passenger-car tires produced in the United States in 1944 through 1946 with the maximum content of GR-S gave useful service for an average of 1½ years in contrast to the average life of prewar passenger-car, truck and bus tires in the 1937-40 period of just under three years. Statistics now available indicate that a prewar passenger-car tire lasted about 27,375 miles, compared with an average of 23,800 miles for wartime tires.

Increased experience with GR-S, changes in tire design, and new manufacturing techniques have improved the quality of rubber tires now being used.

The average durability of truck and bus tires is shown in the following table:

ESTIMATED DURABILITY OF TRUCK AND BUS TIRES

(In Years)

Year	Tire Life	Year	Tire Life
1930	2.73	1940	2.94
1931	2.81	1941	2.60
1932	3.00	1942	3.13
1933	2.86	1943	3.29
1934	2.89	1944	3.18
1935	2.80	1945	2.61
1936	2.62	1946	2.68
1937	2.48	1947	2.84
1938	3.17	1948	3.14
1939	2.68		

The effects of using more natural rubber in 1946 will be reflected in the tire life and renewal demand in 1949, the report said. It appears probable that truck tires will continue to have an average life exceeding three years. Truck tires containing substantial quantities of GR-S have been wearing longer each year since 1945.

Rubber consumed in non-transport products was not much different in the 1946-48 period, averaging 28.2%, from what it was in the 1935, 1937, 1939 period, but the percentage in 1948 at 30.7 was much higher than the 1947 figure of 26. It appears doubtful whether the record tonnage used in non-transport products in 1948 will be equaled in 1949, but the amount used will still be about double the prewar non-transport consumption figure.

Information from the Secretariat of the Rubber Study Group in London under the date of February 4 summarizes the rubber situation for 1948 in comparison with 1947. Total world consumption of natural and synthetic rubbers during 1948 amounted to 1,895,000 tons compared with 1,735,000 tons in 1947. Details of production, consumption, and stocks for both natural and synthetic rubbers follow:

(All figures in thousands of long tons)

NATURAL RUBBER

	1948	1947
Production		
Malaya	698	646
Indonesia	430	278
Ceylon	95	89
British Borneo	62	54
Others	230	188
Total	1,515	1,255
Consumption		
U. S. A.	623	562
U. K.	194	153
Europe	365	210
Rest of world	225	185
Total	1,407	1,110
Stocks		
Producing areas	230	230
Consuming areas*	305	290
Afloats	230	240
Total	765	760

*Excluding such government stocks as are not available to industry.

SYNTHETIC RUBBER

	1948	1947
Production		
U. S. A.	490	509
Canada	40	42
Germany (British Zone)	3	8
Total	533	559
Consumption		
U. S. A.	450	560
U. K.	3	3
Europe	15	32
Rest of world	20	30
Total	488	625
Stocks	1948	1947
Total	125	77

Labor News

The policy committee of the United Rubber Workers of America (CIO), meeting in Cleveland the week of February 21 was asked by union President L. S. Buckmaster

to approve a 1949 bargaining program covering a fourth round of wage increases, pensions, health and sickness insurance, and a guaranteed annual wage. This program would be equivalent to an increase of about 30¢ an hour per worker, about one half of which, or 15¢ an hour, would be in the form of a direct wage increase, and the remainder would be required to cover the cost of the pension and health and sickness insurance.

The pension plan would provide company-financed monthly payments of $100 exclusive of federal social security benefits, and the health and welfare program would include 52 weeks of sickness and accident benefits at $25 a week, $7 a day hospitalization for as many as 120 days, surgical benefits up to $200, and many other items.

It was reported from Cleveland on February 22 that the policy committee had subordinated the demand for pensions and all but eliminated the health and hospitalization insurance plan as a major factor in bargaining in favor of a straight 25¢-an-hour wage increase. An increase of 25¢ an hour would raise the average wage in the industry to $1.75 an hour, the daily rate by $2, and the work week rate by $10.

No official comment was made by rubber industry management on the URWA bargaining program since the earliest date that the union will serve notice on the companies will be in April. Unofficial comment indicated that the demands would meet with considerable resistance. It was considered likely that negotiations may see the union reducing its demands in view of declining employment and a drop in the cost of living. According to another report, the welfare program may become the primary objective of the union when negotiations get under way in view of the fact that rubber workers are already among the highest paid hourly workers in the country.

A 24-hour work stoppage took place at the Goodrich Akron plant on January 25 because of dissatisfaction with the company's work rotation policy brought about by cutbacks in passenger-car tire production. Workers returned to their jobs when told that the grievance would be negotiated. About 3,500 workers were affected.

Work stoppages also occurred in the Goodyear plants in Akron on February 3. The difficulties were due to new wage rates, and production was resumed on February 7. About 1,300 workers were involved in these disputes, one of which was in the tube plant and the other in the hose plant.

A wildcat strike closed the Goodrich plant in Tuscaloosa, Ala., from February 14 to 23. About 1,000 workers were affected. Local URWA officials stated that the walkout resulted from "an accumulation of grievances about working conditions." The company made no comment.

Also the U. S. Rubber plant in Detroit, Mich., was practically shutdown from February 14 through 16 by a walkout of 300 workers, which made 5,600 employes idle. A dispute over alleged inequities in the distribution of work hours each week in the receiving, shipping, and trucking departments was the cause of this difficulty.

New England units of the footwear division of U. S. Rubber announced a curtailment of operations starting February 7, because of lack of orders. A four-day week of 32 hours was planned until March 5, for the Naugatuck, Conn., plant. With the return to the five-day week, however, additional production units are to be suspended.

At the Woonsocket, R. I., plant, the four-day week began on February 7, and besides about 100 workers were laid off.

EAST

Goodrich Chemical Promotions

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O., has made five changes in its sales organization. Robert P. Kenney has been appointed manager of chemical sales, replacing S. L. Brous, who has resigned to accept a position with General Electric Co. Named successor to Mr. Kenney as manager of international sales is James C. Richards, Jr., formerly sales manager of Hycar American Rubber and rubber chemicals. W. D. Parrish, formerly technical service manager for Hycar and rubber chemicals, becomes the new sales manager of that department and is replaced in his former post by Roger C. Bascom, Hycar sales representative in the New England territory. Roger S. Steller has been named for that position.

Mr. Kenney joined the company in 1944 as manager of international service. In 1945 he became the first manager of the company's international sales department, directing the marketing of resins, plastics, rubbers, and chemicals abroad. During the war he was chief of the vinyl resins unit in the WPB Chemical Bureau, directing allocation of vinyl and other synthetic materials.

Mr. Richards came to B. F. Goodrich in 1934. In 1943 he became production manager of the government's American rubber plant at Louisville, Ky., operated by Goodrich, and in 1944 was appointed plant manager of the GR-S plant at Borger, Tex., also operated by the company. Then in 1945, Mr. Richards became head of the Hycar rubber and chemical sales department, directing the sale of nitrile and polyacrylic rubbers and a variety of rubber chemicals.

Mr. Parrish entered the employ of B. F. Goodrich, 20 years ago. Working chiefly in rubber research until 1935, he was sent to set up and operate a research laboratory in Malaya to evaluate rubber latex and crude rubber at its source. He returned to Akron in 1937 and in 1940 was made technical service manager of the Hycar Chemical Co., owned jointly by The B. F. Goodrich Co. and Phillips Petroleum Co. In 1945 this company was absorbed as part of Goodrich Chemical, and Mr. Parrish was made technical service manager for Hycar sales.

Mr. Bascom has been sales representative for Hycar rubber in New England since 1943. He previously had worked for Converse Rubber Co., Rubatex Products, and Standard Products Co.

Mr. Steller became associated with Goodrich in 1942 and until 1944 was a process engineer at the plant in Louisville. He was technical manager of the GR-S plant at Borger from 1945 to 1948, when he joined the sales service laboratory of Goodrich Chemical.

Warwick Chemical Co., division of Sun Chemical Corp., Long Island City, N. Y., has appointed D. H. Litter Co., Inc., and L. H. Butcher Co. distributing agents for its metallic soaps. Litter, will conduct operations through its main office at 114 E. 10th St., New York 3, N. Y., and its Philadelphia, Pa., office at 1617 Pennsylvania Blvd. Butcher, who will cover the West Coast, has main offices at 3628 E. Olympic Blvd., Los Angeles, Calif., and branches in San Francisco and Oakland, Calif.; Portland, Oreg.; Seattle, Wash.; and Salt Lake City, Utah.

Changes at Seiberling

Seiberling Rubber Co., Akron, O., has appointed James H. Higgins manager of the manufacturers' sales department, replacing Sidney G. Olling, who will represent Seiberling in Chicago. Formerly assistant director of operations of the Office of Rubber Director in Washington, Mr. Higgins has been an executive of the Inland Rubber Corp., Chicago, Ill., since the war. He was with Goodyear Tire & Rubber Co. from 1928 to 1942 and was in the manufacturers' sales department there when he left.

Changes in several district sales managers and creation of a new sales district for the company in Minneapolis were also announced by Seiberling.

Jack W. Bingham, district manager in Kansas City, becomes manager of the Minneapolis office. The move is being made to provide more efficient distribution for dealers in the area, formerly served by the Chicago office and a St. Paul warehouse.

Frank Carlson, Chicago district manager, who had previously been manager of the Kansas City district, is again Kansas City district manager.

Earl L. Luthy, a 27-year veteran in the Seiberling organization, moves from Philadelphia, where he has been district manager for the past 11 years, to become Chicago district manager. Succeeding him at Philadelphia is William V. Yingling, a salesman and truck tire engineer in all territories of the company's Philadelphia district for 22 years.

The Seiberling company recently became a member of the American Fair Trade Council, 1434 W. 11th Ave., Gary, Ind.

The Thermoid Co., Trenton, N. J., recently opened a new automotive and industrial warehouse in Chicago, Ill., for the convenience of customers in the Midwest.

Fred Lockwood has been made division manager for the Midwest division for automotive replacement sales. For the past several years he served as a district manager in the Southeast for Thermoid.

Walter Ruddy, of the automotive sales force, was recently assigned to the Wisconsin territory.

Rubber Development Bureau, Washington, D. C., reports that a noticeable feature of the January furniture markets at Chicago, Ill., and Grand Rapids, Mich., was the increased use of latex foam cushioning in the bedding and furniture shown. Many manufacturers were introducing foam upholstered pieces for the first time; while others were using more foam throughout their products than ever before. Especially interesting was the introduction of fully molded latex foam construction in the medium and low priced field. In general, furniture manufacturers favor the use of foam, and if proved that foam upholstery can be sold in the medium and low price field, there is every probability of a swift and definite trend to this type of construction. A similar increase in use of foam was also noticed in the bedding industry, with the latex topper pad being most popular, although many manufacturers have added the fully molded foam mattress to their lines. Latex foam pillows have gained considerable consumer acceptance, and, in general, the consumer is rapidly becoming educated to latex foam.

Notion and Novelty Show

From January 31 to February 4 the Fourteenth National Notion & Novelty Show, composed of 230 exhibitors, was at the Hotel New Yorker, New York, N. Y.

Covering four floors of the hotel, exhibits, which made this the largest show thus far, included many rubber items such as dress shields, foundation garments, garter belts, combs, bathing caps and shoes, elastic sewing thread, shoulder pads, and half rubbers. Exhibited products of plastic were closet accessories, bowl, seat, and appliance covers, play balls, aprons, tablecloths, hangers, shower curtains, bathing caps, storage and cosmetic bags, rainwear, trays and boxes, pillow and mattress covers, slippers, drapes, sock driers, and shapers, name tapes, and umbrellas.

Companies featuring rubber products were: Beyerle Mfg. Co., Inc.; Sturm & Schenberg Inc.; Van Sen, Inc.; Sunwear; Beautis Foundations Mfg. Corp.; David Traum Co., Inc.; E-Z Thread Co., Inc.; G. H. S. Corp.; Consolidated Commodities, Inc., representing Plymouth Rubber Co.; A. A. A. Comb Co.; I. B. Kleinert Rubber Co.; Bean-Bra Foundations, Inc.; Freeman Mfg. Co.; Beltx Corp.; and Pretty Products, Inc.

Plastic items were shown by U. S. Stagalite Co.; Tashman Mfg. Co.; Seal Sac, Inc.; Jera-Na Mfg. Co.; California Creations, Inc.; Sydney-Thomas Corp.; Hollywood Silk Products Inc.; Bland Charnas Co., Inc.; Fran-Jean Novelties; Whit-Mor Mfg. Co.; A. L. Siegel Co., Inc.; Utility Products Co.; Harris Mfg. Co.; Personality Plastics, Inc.; National Plastikwear Fashions, Inc.; Ben Hur Products, Inc.; Equality Novelty Co.; Silross, Inc.; Queen Mode; Anco Products; Central States Paper & Bag Co.; Swan Creations, Inc.; Styletone, Inc.; Protex Products Co., Inc.; The All-Styles Hanger Co., Inc.; Harber Products, Inc.; Sidmar Associates, Inc.; Lucky Mfg. Co., Inc.; The House of Timmons; Vivitex Corp.; Jaysid Mfg. & Dist. Co., Inc.; Midland Products Co.; Tauber Products, Inc.; Penguin Mfg. Co.; Hyrose Mfg. & Export Corp.; Westcraft Plastic Products Co.; Plastron, Inc.; Harjax Products Corp.; Tray Ware, Inc.; Coat Conformers, Inc.; Whitewater Raincoat Co.; Texicote, Inc.; Advance Mfg. Co., Inc.; The Warren Featherbone Co.; General Label & Supply Corp.; Al-lon Mfg. Co. Inc.; Blossom Mfg. Co., Inc.; Transparent Cover Co., Inc.; J. Radley Metzger Co., Inc.; and also Schmelzer Products Co.

Kleinert Rubber sponsored a breakfast-meeting of 650 notions buyers and merchandise men on February 1 at the Hotel New Yorker. Ralph K. Guinzburg, company president, spoke on the advertising and promotion plans of the company for 1949 and stated that these plans are geared to store promotions. A. W. Zelomek, well-known economist, discussed the outlook for merchandising and advised buyers to maintain a cautious attitude, but pointed out that notions departments handle maintenance items which are purchased even in periods of declining incomes. The effect of fashion on notions was discussed by Matilda Taylor, of *Women's Wear*, and the meeting concluded with a showing of beach styles featuring Kleinert's new swim caps and beach bags.

General Magnesite & Magnesia Co. has moved its offices to its factory at Plymouth Meeting, Pa.; mail address, Box 071, Norristown, Pa.

C. F. Safreed

McNeil Buys Cleveland Crane

The Cleveland Crane & Engineering Co., Wickliffe, has been purchased outright by The McNeil Machine & Engineering Co., Akron. Plans have already been made to continue operating Cleveland Crane as heretofore, with no changes in overall management, organization, or policies. For all practical purposes the company name will remain the same. The only change contemplated is merging the two firms with the thought that later on stock of the combined companies will be offered to employes and the public.

The Wickliffe concern organized in 1899 as the Cleveland Crane & Car Co., from the very beginning engaged in the manufacture of heavy overhead traveling cranes. Then in 1919 the Cleveland Tramrail overhead materials handling equipment was developed. In 1931, however, the company began diversifying beyond the materials handling field and developed a complete line of press brakes, known as Steelweld bending presses. In 1945 a line of heavy metal cutting machines, Steelweld pivoted-blade shears, was introduced.

The Akron concern was formed in 1862 as the J. C. McNeil Co. It is operated by C. F. Safreed, president; A. S. Michelson, vice-president and treasurer; T. Henry Williams, secretary; and Frank H. Jennings, assistant secretary-treasurer. The present owners acquired the firm in 1936, and it now is one of the leading manufacturers of rubber-working machinery. Originally McNeil made heating and power boilers and in the early 1900's entered into the paper and rubber machinery field. In more recent years it has been engaged in the development and sale of machinery for curing tires and tubes.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., has announced full-scale production of Vulcan 3, the company's new high abrasion furnace black. The black is now available in commercial quantities. Production facilities are at the company's Ville Platte, La., plant. Vulcan 3, it is said, has outstanding abrasion resistance, reinforcing, and processing properties in all types of rubber, but is especially effective in cold rubber. Laboratory tests are now being confirmed by extensive factory and road-wear tests which have been in progress for many months.

Elections at Okonite

Albert F. Metz was elected president and general manager of The Okonite Co., Passaic, N. J., at a recent directors' meeting. Mr. Metz, previously vice president and treasurer of the company, succeeds Frank C. Jones, who died January 20.

The Board also elected as a director Stephen A. Wilson, the company's general counsel, and elected Donald R. Stevens executive vice president and a member of the executive committee. Mr. Stevens was previously a vice president.

Mr. Metz joined Okonite in 1919 as accountant, following a previous career as assistant to the comptroller of Famous Players Lasky Corp. and as disbursing officer and auditor for the United States Shipping Board during World War I. During his 30 years with Okonite he also served as comptroller and treasurer. Mr. Metz is also president of the American Taxpayers Association; a past president of the New Jersey Taxpayers Association and of the Passaic Chamber of Commerce; head of the Passaic-Bergen Area Planning Association; a trustee of the Passaic Y.M.C.A., of Fairleigh Dickinson College, and of the Collegiate School of Passaic; and chairman of the Mayor's Housing Committee of Passaic.

Mr. Stevens joined Okonite in 1921 as superintendent and became vice president and works manager in charge of its three plants (The Okonite Co., Passaic, The Hazard Insulated Wire Works Division, Wilkes-Barre, Pa., and The Okonite-Callender Cable Co., Inc., Paterson, N. J.). He is also a director of The Okonite Co., the First Paterson (N.J.) National Bank & Trust Co., the Community Building & Loan Association of Ridgewood, N. J., and the New Jersey Taxpayers Association.

The Ceylon Produce & Rubber Co., producer of sole crepe, scrap crepe, pale crepe, and scrap rubber, Colombo, Ceylon, has appointed Burnett Co., 225 Lafayette St., New York 12, N. Y., its representative in the United States. Andre Burnett, head of the company, has had long experience in rubber and its processing. A graduate of the Manchester (England) College of Technology, he was first chief chemist for the Premier Rubber Co. in England. In 1913 he came to the United States to organize the factory of the Kinzie Rubber Co., Chicago, Ill. After service in the British Army he returned to the United States as factory manager for the Chicago Rubber Clothing Co., Racine, Wis. Mr. Burnett later helped reorganize the Marathon Rubber Products Co., Wausau, Wis., and remained there 12 years until 1935 when he joined the London branch of the Witco Chemical Co. Shortly thereafter he formed Burnett & Co. (London), Ltd. to represent the Pequanoc Rubber Co. reclaimed rubbers throughout Europe, until he was transferred to New York in 1947.

Phillips Chemical Co., 605 Evans Bldg., Akron 8, O., a subsidiary of Phillips Petroleum Co., is handling all sales and service work in connection with Philblacks A and O. These materials were formerly manufactured by Phillips Chemical Co. and sold by the petroleum company. The personnel of the Philblack sales-service organization is unchanged and will continue to serve the rubber industry as in the past.

Goodrich Advances Several

Organization of the associated lines sales division of The B. F. Goodrich Co., Akron, O., into five sales regions and appointment of four managers in newly created geographical areas were announced last month, by M. G. Huntington, general manager of the division which handles sales of Brunswick, Diamond, Hood, and Miller brands of tires and accessories.

New division managers and their headquarters are: F. H. Newsom, southwestern, Dallas, Tex.; H. G. Culbertson, northeastern, Akron; Benton Thompson, northwestern, Springfield, Ill.; and H. M. Rockwell, southeastern, Akron. K. K. Kantzer continues as manager of the Pacific Coast division, headquarters, Los Angeles, Calif., a post he has held for several years.

Mr. Newsom joined the company in Dallas in 1923 as an assistant credit manager, was credit manager of the southwestern division several years, joined associated lines as a salesman in 1938, and then became Dallas territory manager.

Mr. Culbertson, with Goodrich 29 years, began as a Diamond tire salesman in Minneapolis, went to Chicago in 1926 to handle Brunswick and Diamond tire sales, and to Atlanta, Ga., in 1929 on the same assignment, became a sales supervisor in associated lines in 1933 with headquarters in Akron, and was field division manager, chain store sales, from 1941 until his present appointment.

Mr. Thompson, who came to Goodrich 33 years ago, has been in associated lines sales since 1923, as territory manager in Indiana, Illinois, and Missouri for the last several years.

Mr. Rockwell started with the company 26 years ago as a salesman in Philadelphia, has held a number of posts in its sales organization, and most recently was manager of distributer sales for associated lines.

Charles F. Pankey has been made regional store manager for the Pacific Coast division of the replacement tire sales division to succeed W. R. Dakan, now manager of the San Francisco district. With Goodrich 15 years, Mr. Dakan started as a stock and service clerk in the Chicago district, later became credit and operating manager at several of the company's stores in the district, and since March, 1945, had been a store supervisor in the Chicago territory.

Everett C. Shingleton has been named assistant product manager for automotive, industrial, and farm services tire sales in the automotive, aviation and government division, succeeding Delmar C. Homer, transferred to the division's New York district. Mr. Shingleton, in the sales promotion department of the replacement tire sales division since his return from service with the Armed Forces, has been with Goodrich since 1937 and in advertising and sales promotion since 1938.

Changes in the industrial products sales department also have been reported.

William A. Schaub has been named manager of the Denver district. With the company since 1918, Mr. Schaub became a sales correspondent in the Kansas City district six months after his service started and was an industrial products salesman in the district for the last 24 years.

Raymond P. Russell has been named manager of the Boston district, succeeding John M. Cooney, transferred to the managership of the Akron, O., district. Mr. Russell has been with Goodrich since 1929, always in the Boston territory. He began as a clerk in the footwear sales department and since 1930 has been in industrial products sales. Among the posts he has held are store manager of the Hope Rubber Co. at Providence, R. I., and sales supervisor in the industrial products Boston district.

Harold F. Mosher has been named manager of the Dallas district to succeed the late Robert T. Kain. Mr. Mosher, with Goodrich since 1922, had been manager of special industrial merchandise sales for the last six years. He is succeeded in that post by D. W. Raleigh, who joined the company in 1937 in Manila, Philippine Islands, and was treasurer of the B. F. Goodrich International Rubber Co., there when he was interned by the Japanese early in 1942.

I. N. Kimsey has been appointed field sales manager. He had been manager of the Akron district for industrial products sales for the last 10 years. Mr. Kimsey joined Goodrich as an industrial products salesman in 1922.

His former post is taken by John M. Cooney, manager of the Boston district for industrial product sales for the last two years. He joined the company in 1933 as a factory employe, became a sales engineer two years later, and in 1940 became sales representative for industrial products in the Dayton, O., territory.

J. R. Thompson has been named manager of flat, conveyer, elevator, and transmission belting, and Paul W. Van Orden has been made manager of V-belts and packing. Mr. Thompson comes to Akron after two years as manager of the Denver district of industrial products sales. He has been with the company since 1930, starting in the textile division of Martha Mills, Silvertown, Ga., and has been in industrial products sales since 1933 except for four years in the U. S. Army Ordnance Corps.

Mr. Van Orden has been with Goodrich 21 years, all in belting sales and engineering.

Ream C. Cook, former manager of the experimental mill room, and Maurice C. Yarborough, in the processing division of the Goodrich company for many years, have joined Standard Products Co., Port Clinton, O.

John M. Davies resigned recently as director of physical research at Goodrich after 23 years with the company.

A new-type aviation oil tank capable of withstanding fire and temperatures of 2,000° F. has been developed by Goodrich for the Navy. Said to be the first of its kind to withstand direct flame, the container is also bullet-sealing. An outer coating in which synthetic rubber is combined with other materials gives unusual resistance to heat and fire, greatly increasing the safety factor of fuel cells, particularly in combat aircraft. The new tank is rigid and considerably lighter than other fuel cells. In tests the tank was undamaged after prolonged exposure to a blowtorch at temperatures over 2,000° F., while ordinary aluminum cells disintegrated in less than 60 seconds. The Goodrich material may also be applied to gasoline tanks and other containers for volatile fuels. Other applications include fuel tanks for automobiles, buses, trucks, and commercial aircraft.

Auto Accessories Show

The twenty-second annual exposition of the Automotive Accessories Manufacturers of America was held in Grand Central Palace, New York, N. Y., on February 7 to 11. Covering three floors of the Palace, the show included displays by approximately 430 exhibitors, with rubber products very much in evidence.

Tires and tubes were shown by Ajax Tire & Rubber Corp., Carlisle Tire & Rubber Co., Falls Rubber Co., The B. F. Goodrich Co., Martin Custom Tires Corp., Murray Tire & Rubber Corp., Norwalk Tire & Rubber Co., and Westminster Tire Corp. General rubber automotive parts, such as pedal pads, floor mats, radiator hose, fan belts, and weatherstripping, were exhibited by Ace Rubber Products, Inc., Anchor Rubber Products, Inc., Durkee-Atwood Co., Globe Rubber Products Corp., Gross Plumbing & Rubber Co., Inc., Kravex Mfg. Corp., La Maskin Co., Manhattan Coil Corp., and Paine & Williams Co.

Tire repair materials, including patches and reliners, were featured by Alligator Rubber Products Co., Inc., Better Monkey Grip Co., H. B. Egan Mfg. Co., Fidelity Mfg. Co., Inc., Greenfield Mfg. Co., and Never-Off Products Co. Miscellaneous exhibits included a display of rubber mats, Koylon foam pads, and coated fabrics by United States Rubber Co.; a full line of tapes shown by Superior Insulating Tape Co.; and a display of tapes and vinyl raincoats shown by Plymouth Rubber Co.

Soulen, Mansfield President

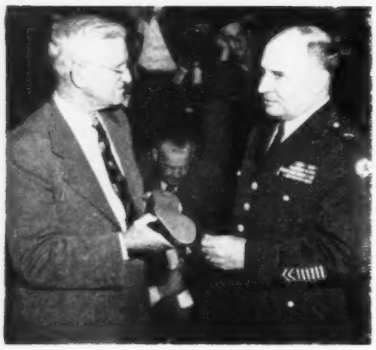
G. W. Stephens has been made chairman of the board of The Mansfield Tire & Rubber Co., Mansfield, O., having retired from the presidency in order to relieve himself of a great many responsibilities and to devote his activities to an advisory capacity and to directing matters of company policy.

New president is H. B. Soulen, since May, 1937, when he joined the company, its vice president and factory manager. He previously had served in similar capacity at Kelly-Springfield Tire Co., Cumberland, Md., and prior to that had been vice president of the Federal Rubber Mfg. Co., Cudahy, Wis. Only recently Mr. Soulen also succeeded Mr. Stephens as a vice president of Copolymer Corp., Baton Rouge, La. The new Mansfield president holds a degree in electrical engineering from the University of Wisconsin and also attended the School of Engineering in Grenoble, France. He first worked for the Brodesser Mfg. Co., saw service in World War I, and was in the engineering department of the Wisconsin Telephone Co. before entering the rubber industry 30 years ago.

Mr. Stephens started with Mansfield in 1913, directing his attention to sales problems. He was made vice president and general manager in 1919 and president in 1923.

Temflex 105—Plastic Tubing

Temflex 105, a new plastic tubing approved by Underwriters' Laboratories, Inc., for continuous use at temperatures up to 105° C., has been announced by Irvington Varnish & Insulator Co., Irvington, N. J. To insure quick identification the tubing has continuous and abrasion resistant marking of the legend "Temflex 105" running the entire length of the tubing. Exhaustive and prolonged laboratory tests on the tubing by the manufacturer show extremely favorable results with regard to retained elongation, tensile strength, flexibility, and dielectric strength after exposure to temperatures up to 150° C. Tests are continuing, but Wemco transformer oil has little effect on the tubing after 1,000 hours exposure at 105° C.



W. E. Kavanagh *(Left)* and Brig. Gen. R. C. L. Graham at Army Shoe Repair Seminar

What's New at Goodyear

The general products division of The Goodyear Tire & Rubber Co., Akron, O., has made several changes in its field organization to handle greatly increased sales activities. Managers of Pliofilm sales in New York, Cleveland, Atlanta, Dallas, Los Angeles, and Chicago become district managers in charge of sales activities in Airfoam, vinyl films, and the builders' supplies and flooring lines, as well as Pliofilm. Elevated to the new posts are W. J. O'Keefe, New York; R. H. Kilgore, Cleveland; T. D. Strickland, Atlanta; R. T. Huffman, Dallas; A. E. Grundy, Los Angeles; and J. B. Post, Chicago. They will report to E. E. Ellies, assistant general manager.

Donald F. Neese and John W. Bear have been appointed district sales managers at New York and Philadelphia, respectively, for the chemical division. Both men had been representatives of Goodyear's plastics and coating department, recently organized as the chemical division to handle sales of rubber chemicals, resins derived from rubber, synthetic rubber, and copolymer resins.

The first shoe repair seminar for the Army, was recently held in Camp Lee, Va., under the direction of the Quartermaster Corps. Presented by W. E. Kavanagh, development manager of Goodyear's shoe products division, the seminar covered a complete, three-day shop process and discussion program for more than 60 enlisted personnel, officers, civilian representatives of the Quartermaster General, Navy, and military personnel from other posts. Purpose of the seminar was to present ways and means of keeping Army personnel better shod by use of improved methods of shoe repair and reconditioning. Conducted in the post's shoe shop, the seminar dealt with every phase of shoe repair and concluded with the enlisted personnel putting soles and heels on their own shoes under the supervision of several seminar instructors, including C. A. Dana, Lee Hood, and T. F. Crimmin, shoe technicians from Windsor Mfg. Corp., Goodyear's shoe products plant.

With the increased availability of high-grade natural rubber having low protein content, Goodyear has returned its cyclized rubber resin, natural rubber Pliolite, to volume production. According to H. R. Thies, chemical division manager, natural rubber Pliolite is still the preferred resin for specialized applications such as in baking primers and enamels, hot melt coatings, certain moisture-proof paper coatings, and fast-drying printing inks.

Installation of a huge rubber-covered roll grinder and other new equipment in a recently completed building has greatly increased the production capacity of Goodyear's industrial roll covering department in Akron, according to E. Peterson, manager of industrial roll sales. The move was made to meet demand of the steel, textile, and paper industries for prompt deliveries of recovered industrial rolls in order to avoid curtailment of production in those industries. Of the latest type, the new roll grinder is designed to grind both concave rolls and straight rolls with catenary crowns. The size of the machine required a special foundation which prevents vibration and permits minute perfection in grinding roll surfaces.

Goodyear is distributing reprints of an article that appeared in the Autumn, 1948, issue of *USGA Journal* describing tests conducted by the United States Golf Association to determine the relative merits of steel spikes and lug soles for golf shoes. Shoes having standard steel spikes were compared with lug soled shoes, both supplied by Goodyear, in walking tests on a putting green, and the steel spikes were shown to cause greater turf damage.

A 33% increase in the use of natural rubber latex in 1949 over the 25,000-long ton consumption last year was predicted by R. P. Dinsmore, Goodyear vice president in charge of research and development. The industry's increased use of raw latex to approximately 34,000 long tons would be largely due to the greatly expanded use of foamed latex cushioning, Dr. Dinsmore said. In anticipation of the demand for this material, Goodyear placed in operation during the past year a new $5,000,000 Airfoam manufacturing plant at Akron, O., and a new creaming plant in Rengam, Johore, Malaya. The accompanying photograph shows the main building of the Rengam plant which contains latex receiving tanks, storerooms, and power plant. Actual creaming is accomplished in the 50,000-gallon tanks shown in the background.

Recent Developments Reported

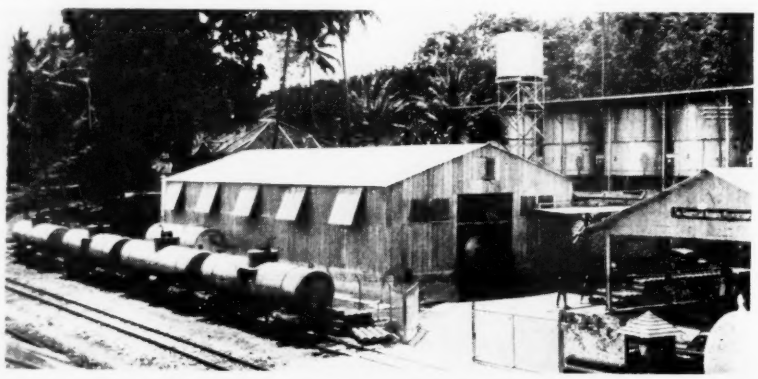
A new-size bicycle tire designed to meet the fast-growing demand from juvenile wheel riders has been added to the cycle tire line manufactured by Goodyear. The new tire is the 20 x 2.125 DeLuxe All-Weather, previously built by the firm in the 24- and 26-inch sizes. M. F. Moyer, manager of Goodyear's cycle tire department, stated that demand for the new tire arose from the big increase during the past few years in the number of young bike riders who require a bicycle smaller in size than the standard 26-inch bike.

A new truck tire, the Hard Rock Rib, has been added to the Goodyear line. Currently being manufactured in three sizes, 12.00-24, 13.00-24, and 14.00-24, this tire is designed especially for front-wheel service in heavy construction, excavation, and strip mining and is expected to help eliminate hard steering and vibration encountered in this service. The tread design of the new tire consists of three heavy circumferential ribs, with the shoulder pattern resembling that of the company's Hard Rock Lug tire, while the carcass is the same as that of the Lug tire.

Motorists are reminded of two important service requirements for Goodyear low-pressure Super-Cushion tires, as follows: (1) the maintenance of correct inflation; and (2) the regular rotation of these tires on a car. While both factors apply to conventional tires, they are especially important in the maintenance of low-pressure tires since any pressure variation can cause a proportionately greater degree of under- or over-inflation. The cold or starting pressure for the Super-Cushion is 24 pounds, and pressure build-ups resulting from car operation should never be reduced below the specified figure. Tires on a car do not wear equally in the different wheel positions, but may vary by as much as 3%. On late model cars the tendency is for tires to show greater wear on front wheels; while on older models the reverse is true. For this reason tires must be rotated regularly to receive equal wear. The first rotation is especially important and should be made shortly after the tires have been driven the first 2,500 miles.

An innovation in the use of sodium dichromate with salt, sprinkled on city streets to combat ice and snow, is saving Akron motorists many thousands of dollars formerly lost through salt damage to car bodies and fenders. Work originally conducted by Akron Service Director M. L. Davis and Goodyear researchers, W. T. Van Orman and H. A. Endres, showed that a 1% mixture of sodium dichromate, by weight, added to salt arrests the latter's corrosive tendencies without adversely affecting tires. Because of the current shortage of dichromate, Goodyear experimented with other chemicals and found that Banox, a warborn material plentiful in supply, would achieve results comparable to those obtained with dichromate, and this new material was adopted by the city of Akron for use in its campaign to combat street ice and snow without damaging car bodies.

Henry B. Hass, since 1937 head of the chemistry department of Purdue University, has been appointed manager of research and development of General Aniline & Film Corp., 230 Park Ave., New York 17, N. Y.



Goodyear Latex Creaming Plant in Rengam, Johore

Personnel Transferred

The United States Rubber Co., Rockefeller Center, New York 20, N. Y., on February 4 formally opened a new building at 999 Lee St., Atlanta, Ga., to house branch operations. Including both offices and warehouse, the building will be headquarters for the distribution of company products in Alabama, Florida, Georgia, North and South Carolina, and eastern Tennessee. Growth of company business in the Atlanta area and the continued expansion of industry throughout the South necessitated the move to larger quarters, according to L. M. Moulson, branch operating manager.

Wilson O. Green has been appointed sales manager of the Fisk tires division, succeeding H. M. Ramsay, transferred to the U. S. Tires division to supervise farm tire sales. Mr. Green was formerly manager of retail merchandising for U. S. Tires and more recently general assistant to Mr. Ramsay. Mr. Green joined U. S. Rubber in 1935 in the operating department at Baltimore. Following sales positions in Charlotte and Raleigh, he returned to Baltimore in 1947 as district manager for U. S. Tires.

Mr. Ramsay was formerly in charge of tractor and implement tire sales at Detroit. He joined the company in 1935 as special sales representative and later became Fisk district manager at Newark, Baltimore, and Chicago. He was appointed sales manager of Fisk tires in 1947.

Both men will be at the company's general headquarters in Rockefeller Center.

The Gillette tires division last month also announced several changes.

R. M. Hood has been appointed advertising and sales promotion manager, succeeding Leon Sklarz, Jr., transferred to the U. S. Tires division. Mr. Hood joined U. S. Rubber in 1935 in the New York advertising department, was made manager of battery and accessory sales of the U. S. Tires division in 1940, was later placed in charge of business development for that division, was appointed sales promotion manager of Gillette in 1943, and in 1947 was transferred to the U. S. Tires division to handle sales promotion of passenger tires.

T. J. McLoughlin has been made manager of sales and service for Gillette, to succeed J. T. Griffith, assigned to a new position in the tire division where he will be concerned with sales production coordination.

A. J. Muller has been transferred to the sales production coordination department where he will be responsible for Gillette production schedules and inventory distribution.

J. Brendan Brady, general manager of the Pacific division, was honored at a dinner in the Fairmont Hotel, San Francisco, February 10, on the occasion of his retirement from the company. Mr. Brady began his career with U. S. Rubber on January 1, 1910, as a salesman in Chelsea, Mass. One year later he was sent to San Francisco as a sales executive, where he remained ever since.

F. B. Davis, Jr., former chairman of the board and still on the directorate of U. S. Rubber, recently was elected a director of the National Distillers Products Corp.

New Products Announced

U. S. Rubber has developed a new long-wearing service entrance cable for connecting main power lines to homes, offices, and industrial buildings. Said to wear four to five times longer than the conventional braided type, the cable has a natural rubber insulation around the conductors and an outside jacket made of neoprene. The neoprene jacket is fire retardant, eliminates the separation of the outside braid from the cable occurring in conventional cables, and provides unusually high resistance to rain, ice and sleet, and sunlight deterioration, it is claimed. The new cable is approximately $\frac{1}{4}$-inch smaller in overall diameter than braided types, but weighs the same.

Spergon, the U. S. Rubber seed treatment, not only protects crop seeds against invasions of fungus disease, but also acts as a growth stimulant, according to tests at the company's agricultural laboratories in Bethany, Conn. It is believed that this stimulating effect alone can increase the yield of corn as much as seven to eight bushels an acre. Tests made of treated and untreated corn seeds confirmed reports from planters that Spergon gives yields considerably above what can be attributed to fungus control. According to H. D. Tate, laboratory director, the fungicide has also produced marked increases in stands and yields of peas, sweet potatoes, and tomatoes.

U. S. Rubber has begun the production of Koylon foam rubber cushions for automobiles that can be installed by the individual car owner to improve the riding comfort of his car. The "seat toppers" are made in two sizes to fit the seats of 1915-1949 model automobiles, as follows: 20 by 52 inches and 20 by 56 inches, both one inch thick. They are easily installed by removing the outer seat cover, placing the foam cushion on the seat, and replacing the seat cover. A tapered edge on the topper provides a neat appearance. The foam cushions will be sold in auto supply and seat covering establishments.

New Cyanamid Plasticizers

Two dioctyl phthalate plasticizers, di-2-ethyl hexyl phthalate and di-iso-octyl phthalate, have been added to the list of chemicals made by American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y. To be marketed under the trade names Aero DOP and Aero DOPI, respectively, the plasticizers are in quantity production at the company's Bridgeville, Pa., plant.

The new materials are well suited for compounding vinyl resins into films, having low heat loss, low brittle points, and good compatibility. They remain liquid down to temperatures of —55°C., thus keeping the vinyl film flexible over an extreme temperature range. Their outstanding electrical properties make them excellent for use in vinyl wire coatings. The new materials are also plasticizers for nitro-cellulose and synthetic rubber where high tensile strength, low-temperature flexibility, and electrical resistivity are desired.

New York Belting & Packing Co., Passaic, N. J., appointed C. A. Franklin, Jr., district manager in the Rocky Mountain area. After seven years with oil field supply homes Mr. Franklin joined New York Belting in July, 1936. He recently was the company's representative in Texas, Arkansas, and Louisiana.

Paul J. Breden has been named southern district manager, with headquarters in Dallas, Tex., to succeed the late J. Edwin Conaway. Mr. Breden has been with New York Belting for the past 25 years, at company headquarters in Passaic.

Vinylite Enamel

A new floor enamel, based on Vinylite resins made by Bakelite Corp., has been developed by Benjamin Foster Co., Philadelphia, Pa. For use on all wood, concrete, and metal floors, the enamel has been proved, it is said, by exhaustive tests to outwear, outlast, and outperform any other floor coating now on the market. The new coating is unaffected by water, greases, oils, brine, alcohols, petroleum solvents, soaps, all alkalies, and most acids and will withstand at least twice as much dry abrasion and 10 times as much scrubbing with alkali solutions as floor enamels having any other base, it is further claimed. Another reported feature of the enamel is that the Vinylite resins provide a slip resistant surface that can be easily cleaned with soap and water. Available in a range of attractive colors, the coating is easily applied by brush or spray and is recommended for surfaces that get particularly hard wear, such as floors, steps, baseboards, railings, doors, trim, walls, counter tops, desk tops, hallways, kitchens, etc.

Panelyte Division, St. Regis Paper Co., 230 Park Ave., New York 17, N. Y., has signed technical aid agreements for the manufacture and sale of Panelyte laminated plastics in England and Sweden. According to C. R. Mahaney, St. Regis vice president and Panelyte general manager, production and patent license agreements were signed by G. P. Bassett, director of Ashdowns, Ltd., St. Helens, England, and Otto Wendt, president of Skanska Attikfabriken A.B., Perstorp, Sweden. In addition to making available its patents, machinery designs, and formulae used in the production of plastics, Panelyte will also keep the foreign concerns informed of new inventions, improvements, and other developments in Panelyte production. Likewise, as a reciprocal arrangement, the agreement provides that Panelyte will be kept informed of new plastics developments abroad.

Chemical Markets Research Association and **Polytechnic Institute of Brooklyn** in a joint all-day session at the Hotel Biltmore, New York, N. Y., on February 10 presented experts representing the chemical industries and education who set forth the problems involved in bringing new chemicals to the public. Among the scheduled speakers and their topics were: Robert M. Prather, market research division, Standard Oil Co. of Indiana, "Market Research on Synthetic Detergents"; Harry Outcault, manager of zinc oxide sales, St. Joseph Lead Co., "Inadequate Market Research Leads to Costly Errors"; W. J. Sparks, director of the chemical division, Standard Oil Development Co., "Market Research Aids Experimental Research." Walter J. Murphy, editor of A.C.S. journals, as the luncheon speaker, discussed "Market Data in Chemical and Engineering News."

Pennsylvania Industrial Chemical Corp., Clairton, Pa., will erect a new million-dollar distillation plant on a five-acre tract near West Elizabeth, Pa. In about six months the company expects to complete the installation of an entire distillation unit for the separation of precision fractions of aromatic oils, one of the initial processes in the development of resins used

in rubber, textiles, floor coverings, paints and varnishes, adhesives, and other products. Erection of the distillation units is the first step proposed by the company in its long-range expansion program. According to President R. W. Ostermayer, the new plant will be largely automatic in operation and will be an auxiliary to the Clairton operations. The company produces synthetic resins from the by-products of coke oven operations and gas plant drip oils and from raw materials supplied by turpentine production. The company is the only domestic manufacturer of synthetic hydrocarbon resins produced from turpentine. Other products include resins based on styrene, oils for reclaiming natural and synthetic rubbers; and many grades of aromatic solvents produced as by-products of the resin manufacture.

American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has formed a new product development department, with George W. Russell as manager, which will report directly to the company's vice president in charge of research and development. One of the functions of this department will be to determine whether economic uses exist for selected products developed in Cyanamid's research laboratories, for which sales applications are not yet established. At present most of the group's activity will be devoted to the evaluation of organic nitrogen compounds, although eventually the entire range of American Cyanamid's products will be included. In addition to market development the group will conduct market research on currently manufactured products as well as those in the development stage.

New Glass Laminate

A new glass-phenolic laminate, Grade 170, said to be superior by test to any similar laminate now in the market, has been announced by Panelyte division of St. Regis Paper Co., New York, N. Y. Properties of the new laminate follow: tensile strength, 52,000 p.s.i.; flexural strength, 69,000 p.s.i.; bonding strength, 1,900 p.s.i.; impact strength 37 ft.lbs. on flat side, 18 ft.lbs. on edge; density, 1.78 gms./cc; water absorption, 0.06%; dielectric strength, 580 volts mil; power factor, 0.006 at 10^6 cycles; dielectric constant 4.45 at 10^6 cycles; and loss factor, 0.027.

The new laminate will be produced in standard sheet sizes of 36 by 36 and 36 by 48 inches in natural color with a semi-gloss finish and in thicknesses ranging from 1/32-inch to two inches. Considerable interest has already been shown in the material because of its very low water absorption and high strength. It is said that the new grade may eliminate the need of anti-fungus treatments and other special handling now required for equipment in tropical climates and under high humidity conditions.

WEST

Rude Advanced

A. H. Rude, vice president of Aerojet Engineering Corp., Azusa, Calif., and associated with The General Tire & Rubber Co., Akron, O., since 1920, on February 15 was named executive vice president of Aerojet and managing director of General Tire's California operations, replacing Dan A. Kimball, appointed Assistant Secretary of the Navy for Air by President Truman. These operations of General Tire include in addition to Aerojet and its joint venture the Parsons-Aerojet Co., the Marquardt Aircraft Co., Van Nuys, and the General Tire & Rubber Co. of California, South Pasadena.

Mr. Rude was general manager of Aerojet from 1944 to 1948 and has served continuously as vice president until his appointment to succeed Mr. Kimball in the direction of General Tire's California operations.

Aerojet Engineering is engaged in the research, development, and manufacture of jet propulsion motors and is one of the largest manufacturers of rockets in the world. Marquardt Aircraft is an outstanding organization in this country in the development of the ramjet engine. The South Pasadena concern specializes in ordnance equipment. Parsons-Aerojet is a joint venture of Aerojet Engineering and the Ralph M. Parsons Co. engaged in the engineering, design, and construction of rocket test facilities for the Air Force and the Navy.

Gates Rubber Co., Denver, Colo., has announced a new-type dual-line welding hose featuring patented one-piece construction and touch identification. The oxygen and the acetylene hose are built securely into one cover, and a shallow groove makes it possible evenly to separate the lines for coupling to the torch and tanks. There is never any need of clamps or friction tape to keep the lines together, even at the points where the lines are separated for coupling. To permit touch identification of the lines by the welder, the oxygen side of the cover is smooth and has a green "oxygen" label at five-foot intervals while the acetylene side is corrugated. The individual tubes of the hose are not affected by acetylene or the aging action of oxygen. Each tube is reinforced with a braid of strong cords to withstand gas pressure. The new hose is available in 3/16- and 1/4-inch sizes, in both coupled and uncoupled lengths.

Sierra Rubber Products & Engineering Co., 2050 Laura Ave., Huntington Park, Calif., has purchased the plant of Franklin Rubber Co., Inc., 419 S. Hindry St., Inglewood, Calif.

Artist's Drawing of American Latex Products Corp.'s New Plant at Lawndale, Calif.

Monsanto Chemical Co., St. Louis, Mo., at a recent board meeting elected as a vice president Joseph R. Mares, since January, 1947, general manager of the Texas division. Mr. Mares came to Monsanto in 1929 as patent counsel; in 1943 he became chief patent attorney for the National Defense Research Committee at Cambridge, Mass. He was made director of Monsanto's development department in 1943.

D. J. Beaver, research director at the Nitro, W. Va., plant since 1942, has been transferred to company headquarters. As senior scientist for the division's rubber service department, Dr. Beaver will work on exploratory rubber chemicals and related products in close liaison with the company's Nitro, Akron, and Dayton, O., installations. Prior to joining Monsanto in 1933 as a research chemist, Dr. Beaver had served in the same capacity with Firestone Tire & Rubber Co., Grasselli Chemical Co., and Combustion Utilities Corp.

Kirkhill Rubber Co. has purchased acreage in Brea, Calif., for a new plant in addition to its Los Angeles factory.

F. P. Hartung, formerly of Reeves Rubber, Inc., is now with Kirkhill Rubber.

Union Pacific Railroad Co., Omaha, Neb., has begun a grass roots campaign to reduce freight loss and damage. Conceived and directed by O. J. Wullstein, the company's general freight claim agent, the campaign is based on a series of 12 posters directed to freight handlers, operating men, and all others associated with the movement of freight. The posters are in color and measure 17 by 22 inches. Thirty-six thousand posters have been printed, the great majority of which will be used by Union Pacific, but sets are available to other interested railroads. The posters feature photographs of Union Pacific employes, such as checkers, truckers, stowers, engineers, etc., with each man quoted on his opinion as to how his job should be done to prevent freight loss and damage

California Rubber Products, Inc., Hawthorne, Calif., recently purchased land near the Northrop Aircraft factory and plans on building there.

George Gregory is now with Products Research Co., 5426 San Fernando Rd., Los Angeles, Calif.

American Latex Products Corp., Los Angeles 15, Calif., began construction in January of a three-unit group of new factory and general office buildings in Lawndale, Calif. According to President C. M. Christie, the new structure will cost more than $250,000 and will be completed between May 15 and June 1.

The new buildings, being erected on a two-acre site, will have a total area of 29,100 square feet. The office building, of 5,000 square feet, will be connected to the 19,000-square-foot main factory building devoted to foam rubber fabrication into products. The third building, 4,000 square feet, will be a chemical plant to manufacture adhesives and thermal barrier materials. The company is said to be one of the worlds' largest fabricators and distributers of foam rubber, and it also produces an extensive line of protective coatings, industrial adhesives, and thermal barrier materials. The new plant will enable the company materially to increase its manufacturing capacity as well as enlarge its stocks and lines of merchandise.

NEWS ABOUT PEOPLE

Harry L. Ebert has taken over new duties as chief chemist of Firestone Industrial Products Co., Fall River, Mass., where an extensive expansion program is under way for the manufacture of foamed latex products. Mr. Ebert, with Firestone for 13 years, was chief chemist of Firestone Industrial Products at Akron prior to the transfer to Fall River.

J. J. Allen, chief chemist of the Fall River plant for the past 9½ years, has been named chief chemist of Firestone Industrial Products in Akron. He has been with Firestone for 22 years.

Herb McBride is now working with Reinke & Amende, Los Angeles, on crude rubber sales in southern California.

Emile Coene, Jr., is now assistant to L. E. Coleman, vice president in charge of sales, A. G. Spalding & Bros., Inc., Chicopee, Mass. Mr. Coene previously had been assistant to the president of John W. Harris Associates, the firm that built the addition to the Spalding plant.

Frank B. Jewett, formerly chairman of the board, Bell Telephone Laboratories, has accepted an appointment as a member of the board of trustees of Battelle Memorial Institute, Columbus, O. He fills the vacancy created by the death of Rolland C. Allen.

Seward T. Salvage, assistant district manager of industrial bearing sales in the Cleveland office, has been made sales promotion manager of The Timken Roller Bearing Co., with headquarters in Canton, O. He came to Timken in August, 1933, as a sales engineering trainee; a year later became a sales engineer in the industrial bearing sales division, assigned to the Pittsburgh office; in 1937 was transferred to the Houston, Tex., office, and three years later was promoted to district manager in the Los Angeles office; where he remained until he entered the U. S. Navy in 1943. Returning to civilian life in 1945, Mr. Salvage was appointed assistant district manager at Cleveland.

Ralph M. Johnson, general sales manager of Norton Co., Worcester, Mass., has been elevated to a vice presidency, in charge of sales.

John M. Dolan is now vice president in charge of sales for The Hydraulic Press Mfg. Co., Mt. Gilead, O. Mr. Dolan was formerly vice president (sales) of the LeRoi Co. and before that was with the Sullivan Machinery Co.

Kenneth B. Osborn, president of General Latex & Chemical Corp., Cambridge, Mass., recently was elected a director of the County Bank & Trust Co., Cambridge.

Victor Dorkovich has joined the consulting engineering firm of R. S. Aries & Associates, 26 Court St., Brooklyn 2, N. Y., as a senior associate. He will be working on coal-tar chemicals, wood preservatives, plastics and resins, from both the technical and economic point of view.

George H. Kent

George H. Kent has been appointed director of sales for E. F. Drew & Co., Inc., 15 E. 26th St., New York 10, N. Y., responsible for the coordination of all sales activities of the operating divisions of the company. Before joining Drew, Mr. Kent was director of sales-planning and general economics for Koppers Co., Inc., and, previously, director of marketing research for the Libbey-Owens-Ford Glass Co.

Henry A. Garfield recently joined William Whitman Co., Inc., 261 Fifth Ave., New York 16, N. Y., to handle the sale of plastic film and extruded products in the New England area. His headquarters are at the Boston, Mass., office, 78 Chauncy St. Mr. Garfield has been active in the plastics industry for several years and has devoted his time to sales and technical services for the promotion of vinyl film and vinyl extruded products.

Clyde B. Lynde has been appointed vice president and general manager of the insulation division of The Eagle-Picher Sales Co., 900 American Bldg., Cincinnati 1, O. Mr. Lynde joined The Eagle-Picher Co. in 1933 as Joplin insulation district manager and head of the insulation contracting department of that company. After more than 10 years he resigned to go into the insulation contracting business for himself as a distributer for Eagle-Picher insulations in the Houston, Tex., area.

Wilfred F. L. Place recently was appointed general manager of Abrasifs Durex, 230 Ave. Laurent-Cély Gennevilliers (Seine), France. Dr. Place, who joined the Durex Corp., New York, in 1946, has now taken up residence in Paris, France.

J. C. Fink has been made manager of the industry engineering department of Westinghouse Electric Corp., East Pittsburgh, Pa. With the company since 1927, Mr. Fink served most recently as manager of the general mill section of the industry engineering department with direction and supervision of engineers engaged in the application of electrical equipment to the paper, machine tool, textile, rubber, food, and materials handling industries.

G. F. D'Alelio, assistant director of research for Koppers Co., Inc., Pittsburgh, Pa., believes polymer chemists are slowly approaching the point where they will be able to build any desired quality into synthetic rubbers, plastics, or fibers. Speaking before members of Robert Morris Associates, a bankers' group, on February 11, Dr. D'Alelio said that research in the grouping and combining of molecules to make materials with unusual qualities has advanced spectacularly since 1939. Further great strides will come in the next few years. The speaker described recent developments in synthetic rubbers, plastics, and fibers and predicted further advances and increased use of these materials.

Howard F. Parkerton, Jr., recently resigned from Farrel-Birmingham Co., Inc., Los Angeles, Calif., and is operating his own business, mechanical engineering and design of rubber machinery, at 10415 San Luis Ave. South Gate, Calif.

Herbert J. Due, sales representative in northern New Jersey for St. Joe lead-free zinc oxides, products of St. Joseph Lead Co., 250 Park Ave., New York 17, N. Y., has been assigned, in addition, the Trenton, N. J., central New Jersey, and northeastern Pennsylvania areas. Mr. Due has been with the company 22 years.

As in the past, warehouse stocks will be maintained in Trenton and Newark to serve less-than-carload customers, and carload shipments will be made direct from the plant at Josephtown (Monaca), Pa.

George Winters, vice president of The La Favorite Rubber Mfg. Co., Hawthorne, N. J. died suddenly on January 21.

R. J. Hull, who recently returned to this country after an extended stay as technical director of the B. F. Goodrich affiliate in Holland, has joined Phillips Petroleum Co. as assistant carbon black export manager in New York.

Edwin J. Fitzpatrick, formerly vice president and director of American Home Foods, Inc., is now executive vice president of Industrial Tape Corp., New Brunswick, N. J.

C. R. Terry, after 11 years as sales engineer for The Hydraulic Press Mfg. Co., has established Terry Machinery Co., Hanna Bldg., Cleveland, O., a sales agency for metal working machinery. Mr. Terry also had been a buyer of machinery for The B. F. Goodrich Co. During the early stages of the late war Mr. Terry, while on leave of absence from the company, organized the Ohio OPM offices and served as Cleveland manager and State director.

Donald G. Benson, technical director of the Cia. Goodrich Cubana, Havana, Cuba, since 1942, has resigned, but will remain in Cuba in an executive capacity with another rubber company.

L. W. Moore has been appointed sales manager of The Williams-Bowman Rubber Co., 1941-51 S. 54th Ave., Cicero 5., Ill., manufacturer of mechanical rubber products since 1903. Mr. Moore was with United States Rubber Co. in factory and sales capacities for 23 years.

FINANCIAL

Crown Cork International Corp., Baltimore, Md., and wholly owned domestic subsidiary. For 1948: net profit, $629,385, equal to $3.35 each on 187,913 class A shares, compared with $415,941, or $2.21 a share, in 1947.

Dayton Rubber Co., Dayton, O. Year ended October 31, 1948: net profit, $743,870, equal to $1.44 a common share, against $1,815,624, or $3.80 a share, in the preceding fiscal year; net sales, $27,327,074, against $34,163,450.

Diamond Alkali Co., Cleveland, O. Nine months ended September 30, 1948: net profit, $3,774,070, equal to $3.47 each on 1,086,434 shares, against $3,215,695 or $3.03 each on 1,062,434 shares in the 1947 period.

Endicott Johnson Corp., Endicott, N. Y. Year ended November 30, 1948: net profit, $3,623,162, equal to $4.11 a common share, compared with $2,938,395, or $3.27 a share, in the previous fiscal year; sales, $148,650,282, against $142,029,421.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Year ended October 31, 1948: net profit, $27,674,344, equal to $13.83 each on 1,951,334 common shares, contrasted with $26,977,877, or $13.45, each on 1,950,834 shares in the preceding fiscal year; net sales $633,858,425, against $638,477,166; income taxes, $21,850,000, against $17,750,000; reserve for contingencies, $4,000,000, against $0; total inventories, $139,534,370, against $128,025,265; current assets, including $23,721,318 cash, $241,605,176, current liabilities, $80,888,394, compared with $25,007,666, $225,500,073, and $79,914,787, respectively, on October 31, 1947.

Flintkote Co., New York, N. Y., and subsidiaries. For 1948: net income, $7,748,683, equal to $5.86 each on 1,257,935 common shares, against $7,802,379, or $6.27 each on 1,183,921 shares, in 1947; net sales, $81,297,857, against $73,625,154; income taxes $5,006,069, against $5,086,018.

Goodyear Tire & Rubber Co., Akron, O., and subsidiaries. For 1948: net profit, $24,005,518, equal to $10.25 each on 2,065,411 common shares, compared with $25,544,943, or $10.93 a share, in 1947; net sales, $704,875,941, against $670,772,647; income taxes, $28,749,422, against $29,549,263; foreign investment reserve, $6,500,000, against $7,500,000; current assets, $302,916,927, against $291,453,679; current liabilities, $46,719,452, against $48,410,688; inventories, $163,772,003, against $149,332,704.

Hercules Powder Co., Wilmington, Del. For 1948: net income, $10,947,062, equal to $3.99 each on 2,633,948 common shares outstanding, contrasted with $12,934,430, or $4.75 each on 2,633,420 shares, in 1947; net sales, $129,267,020 against $131,269,790; construction expenditures, $7,600,000, against $14,500,000; current assets at the year-end, $47,012,705, against $45,071,621 on December 31, 1947; current liabilities, $12,572,754, against $14,981,552.

Koppers Co., Inc., Pittsburgh, Pa. For 1948: net earnings, $10,552,825, equal to $8.84 each on 1,125,825 common shares, contrasted with $6,165,783, or $4.94 a share, the year before; net sales, $200,223,748, against $162,457,305; taxes, $9,111,400, against $7,486,534.

Monroe Auto Equipment Co., Monroe, Mich. Second half, 1948: net income, $532,177, equal to $1.27 a common share, against $320,899, or 72c a share, in the '47 half; sales, $8,971,751, against $6,367,925.

Monsanto Chemical Co., St. Louis, Mo., and subsidiaries, excluding British and Australian ones. For 1948: net income, $18,042,473, a new high and equal to $3.95 each on 4,274,945 common shares, contrasted with $15,263,424, or $3.59 a share, a year earlier; sales, $161,609,441, another record, against $143,403,161.

New Jersey Zinc Co., New York, N. Y. For 1948: net profit, $9,435,814, equal to $4.81 a share, against $8,243,305, or $4.21 a share, the year before.

Plymouth Rubber Co., Inc., Canton, net profit, $159,167, equal to 18c a share, against $1,126,227, or $1.25 a share, in the preceding fiscal year; net sales, $10,631,190, against $11,221,941.

Rome Cable Corp., Rome, N. Y. Nine months ended December 31, 1948: net profit, $865,421, equal to $2.12 a common share, against $797,700, or $1.94 a share, in the 1947 period; reserve for taxes, $529,700 against $492,000.

Sun Oil Co., Philadelphia, Pa., and subsidiaries. For 1948: consolidated net income, $42,853,839, equal to $8.61 each on 4,928,597 common shares, contrasted with $24,339,913, or $5.28 a share, in the preceding year.

Union Carbide & Carbon Corp., New York, N. Y., and subsidiaries. For 1948: net income, $102,335,053, equal to $3.55 each on 28,807,314 capital shares, compared with $75,666,792, or $2.62 a share, in 1947; sales, $631,619,557, against $521,844,814; income taxes $57,180,998, against $46,501,216.

United Elastic Corp., Easthampton, Mass., and wholly owned subsidiaries. For 1948: net income, $1,180,903, equal to $7.90 each on 149,500 capital shares, against $1,394,761, or $9.33 a share, in 1947.

United States Rubber Co., New York, N. Y. For 1948: net earnings, $20,141,585, equal to $8.48 each on 1,761,092 common shares, contrasted with $21,753,317, or $9.39 a share, in 1947; consolidated net sales, $572,024,663, against $580,968,091; income taxes, $14,757,417, against $13,725,369; inventories, $136,048,642, against $121,362,263; current assets, $248,027,454 against $252,141,343; current liabilities, $75,965,876, against $81,988,939.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. For 1948: net income, $15,875,193, equal to $5 a share, against $13,376,662, or $4.22 a share, in 1947.

Timken Roller Bearing Service & Sales, Ltd., Toronto, Ont., subsidiary of The Timken Roller Bearing Co., Canton 5, O., has appointed T. F. Rose manager, following the recent death of C. E. Webster, manager of the Canadian concern since 1930. Mr. Rose joined Timken in July, 1924, and served successively as a sales representative in the Chicago and Cincinnati offices, as manager of the Pittsburgh office and then of the Cincinnati branch service sales division, in which capacity he has been succeeded by H. C. Telford, assistant manager of the Atlanta, Ga., branch, where he started in January, 1928.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Armstrong Cork Co.	Com.	$0.40	Mar. 1	Feb. 8
Belden Mfg. Co.	Com.	0.30 q.	Mar. 1	Feb. 17
Brunswick-Balke-Collender Co.	Com.	0.25 q.	Mar. 15	Mar. 1
	Pfd.	1.25 q.	Apr. 1	Mar. 21
Canada Wire & Cable Co., Ltd.	A	1.00 q.	Mar. 15	Feb. 28
	B	0.50 incr.	Mar. 15	Feb. 28
Collyer Insulated Wire Co., Inc.	Com.	0.20	Feb. 1	Jan. 25
Crown Cork & Seal Co., Inc.	Com.	0.25	Feb. 28	Feb. 11
	Pfd.	0.50 q.	Mar. 15	Feb. 18
Crown Cork International	"A"	0.25 q.	Apr. 1	Mar. 18
Electric Hose & Rubber Co.	Com.	0.30 q.	Feb. 18	Feb. 11
Flintkote Co.	Com.	0.50 q.	Mar. 5	Feb. 19
	Pfd.	1.00 q.	Mar. 15	Mar. 1
General Tire & Rubber Co.	Com.	0.25 q.	Feb. 28	Feb. 18
Hewitt-Robins, Inc.	Com.	0.25 q.	Mar. 15	Feb. 17
Johns-Manville Corp.	Com.	0.40 incr.	Mar. 11	Feb. 28
J. B. Kleinert Rubber Co.	Com.	0.25	Mar. 11	Feb. 25
Lea Fabrics, Inc.	Com.	0.37½	Mar. 1	Feb. 14
Minnesota Mining & Mfg. Co.	$4 Cum. Pfd.	1.00 q.	Mar. 12	Feb. 26
Mohawk Rubber Co.	Com.	0.25	Mar. 31	Mar. 12
Philadelphia Insulated Wire Co.	Com.	0.10 irr.	Feb. 15	Jan. 28
Raybestos-Manhattan, Inc.	Com.	0.37½	Mar. 12	Feb. 28
Rome Cable Corp.	Com.	0.15 q.	Mar. 30	Mar. 10
	Com.	0.15 ext.	Mar. 30	Mar. 10
	Pfd.	0.30 q.	Apr. 1	Mar. 10
Russell Mfg. Co.	Com.	0.37½ q.	Mar. 15	Feb. 28
Seiberling Rubber Co.	Pfd.	1.13 q.	Apr. 1	Mar. 15
	Pfd. "A"	1.25 q.	Apr. 1	Mar. 25
A. G. Spalding & Bros., Inc.	Com.	0.25 red.	Mar. 15	Mar. 8
Tyer Rubber Co.	Pfd.	1.06¼ q.	Feb. 15	Feb. 1
United Elastic Corp.	Com.	0.75 q.	Mar. 10	Feb. 15
United States Rubber Co.	Com.	1.00	Mar. 10	Feb. 18
	Pfd.	2.00 q.	Mar. 10	Feb. 18
	Pfd.	2.00 q.	June 10	May 16
Viceroy Mfg. Co., Ltd.	Com.	0.15 q. incr.	Mar. 15	Mar. 1
Westinghouse Air Brake Co.	Com.	0.50 q.	Mar. 15	Feb. 15
Westinghouse Electric & Mfg. Co.	Pfd. "A"	0.87½ q.	Mar. 1	Feb. 7
	Pfd. "B"	0.95 q	Mar. 1	Feb. 7

Patents and Trade Marks

APPLICATION

United States

2,457,897. **Tire Having a Sidewall and a Rubber Vane Unit Vulcanized thereto.** R. J. Hull and R. W. Hursh, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,457,899. **Tire Having Vanes of Rubber-like Material Attached to a Sidewall.** R. W. Hursh, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,457,944. **Ventilated Shoe, Including an Insole of Open-Mesh Netting, a Slip Sole of Flexible Resilient Plastic, and a Rubber Sheet Outside the Slip Sole.** A. G. Vlastos, New York, N. Y.

2,458,057. **Round-Type Transmission Belt, Including a Belt Member Embodying a Metallic Twisted-Strand Core and a Rubber-Like Covering Bonded thereto.** W. R. Burtle, Upper Darby, Pa.

2,458,166. **Composite Pressure-Sensitive Adhesive Sheet Material, Including an Adhesive Layer of Rubber on One Side of a Backing Layer and on the Other a Butadiene-Acrylonitrile Barrier Layer and a Thin Film of Material Repellent to the Rubber Adhesive Layer Selected from the Group of Cellulose Esters and Ethers, Polyvinyl Esters, and Polyvinyl Butyral.** H. N. Homeyer, Jr., Elmhurst, Ill., assignor to Kendall Co., Boston, Mass.

2,458,184. **Laminated Electrically Conducting Panel, Including a Sheet of Flexible Material Coated with an Electrically Conducting Synthetic Resin Compound, Protected by a Pair of Layers of Synthetic Resin Coated Material, and Having an External Sheet of Flexible Transparent Synthetic Resin over a Decorative Layer.** L. Marick, Grosse Pointe Farms, Mich., assignor to United States Rubber Co., New York, N. Y.

2,458,570. **Mounting for Fluid Containers.** W. L. Davidson and H. W. Lewis, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,458,571. **Resilient Mounting for Fluid Containers.** P. J. Dasher, Stow, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,458,572. **Rubber Cushioning Elements in Friction Shock Absorbing Mechanism for Railway Draft Riggings.** A. E. Dentler, La Grange, assignor to W. H. Miner, Inc., Chicago, both in Ill.

2,458,750. **Rubber Backing Coating for a Hard-Surfaced Flexible Floor or Wall Covering.** S. G. Trepp, Dedham, assignor to Bird & Son, Inc., East Walpole, both in Mass.

2,459,364. **In a Method of Making Crepe Paper, the Use of an Aqueous Solution of a Polymerizable Synthetic Resin.** R. F. Charles, South Acton, and F. W. Durgin, Natick, assignors to Dennison Mfg. Co., Framingham, all in Mass.

2,459,598. **Bearing Including a Radially Perforated Sleeve and Integrally Molded Plastic Material Infilling the Perforations and Lining the Sleeve Interior.** L. L. Stott, assignor to Polymer Corp., Reading, Pa.

2,459,653. **Insulated Conductor, Including a Conductor Covered with Polymerized Tetrafluoroethylene, an Exterior Layer of Inorganic Fibrous Material, Impregnated and Bonded with a Silicone Resin.** J. J. Keyes, Edgewood, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.

2,459,721. **Resilient Fibrous Strip Ring Gasket Wrapped about with a Thin, Flexible Heat and Solvent Resistant Tape of Polytetrafluoroethylene.** E. J. Poltorak, Somerville, N. J., assignor to Johns-Manville Corp., New York, N. Y.

2,459,737. **Endless Band Track, Including a Wire-Cable Reinforced Rubber-Like Body with Ribs and Grooves Faced with Rubberized Fabric.** R. W. Allen, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,747. **Multi-Ply Bullet-Sealing Fuel Cell Having an Opening in Which Is Arranged an Oil-Resistant Synthetic Rubber Fitting.** H. H. Kolbe, Los Angeles, Calif., assignor to Firestone Tire & Rubber Co., Akron.

2,459,750. **Tire Tread.** C. C. Dybvig, Birmingham, Mich., assignor to Firestone Tire & Rubber Co., Akron, O.

2,459,751. **Molded Rubber Traction Chain.** A. B. Skromme, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,757. **Camelback Material.** T. Q. Smith, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,758. **Seat Back.** H. C. Flint, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,762. **Tire Tread.** A. Hargraves, Cuyahoga Falls, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,459,803-804. **Felt-Like Products Formed from a Mixture of Textile Fibers and Thermoplastic Staple Resin Fibers Formed from a Copolymer of Vinyl Chloride and Vinyl Acetate.** C. S. Francis, Jr., Chestnut Hill, Pa., assignor, by mesne assignments, to American Viscose Corp., Wilmington, Del.

2,460,116. **Control Device, Including in a Container a Quantity of Cold Flowing Solid Plastic Material Having a High Degree of Bounce.** C. E. Bazley, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,460,118. **Emergency Road Wheel and Tire Assembly for Automobiles.** F. C. Kember, Buenos Aires, Argentina.

Dominion of Canada

453,380. **Adhesive Bandage for the Tip and Nail Area of the Finger.** R. H. Sebastian, Gautier, Miss., U.S.A.

453,550. **Wrapping Material Consisting of a Plurality of Laminated Rubber Hydrochloride Sheets Combined Marginally into an Improved Seam Construction.** P. M. Gilfillan, Mount Vernon, O., assignor to Shellmar Products Corp., Chicago, Ill., U.S.A.

453,556. **V-Type Belt.** E. E. Brunner, assignor to Read Machinery Co., both of York, Pa., assignor to Standard Stoker Co. Inc., New York, N. Y., both in the U.S.A.

453,655. **Insulated Electrical Conductor in Which the Conductor Is First Wound with Fiber Glass Ribbon, Next with Fibrous Textile Material over Which Is a Jacket of Polychloroprene, and Finally a Covering of a Thin Strong Film of Synthetic Linear Polyamide.** E. S. McConnell, Scarborough, N. Y., W. K. Priestley, West Barrington, R. I., and V. F. Volk, New Haven, Conn., all in the U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,743. **Double-Walled Bag of Plasticized and Unplasticized Rubber Hydrochloride.** J. E. Snyder, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

454,134. **Transmission or Conveyer Belt Having a Body of Rubber and Internal Reinforcement of Overlapping Plates of Steel or the Like Embedded in the Rubber.** D. E. F. Canney and E. E. Hardy-Birt, Bentham, Lancaster, and W. S. Short, assignors to George Angus & Co., Ltd., both of Newcastle-on-Tyne, Northumberland, England.

United Kingdom

613,564. **Endless Tracks for Vehicles.** Wingfoot Corp.

613,609-610. **Swim Fin.** L. M. De Corlieu.

613,615. **Collapsible Boats.** M. T. De Lara.

613,636. **Resilient Mountings.** Dunlop Rubber Co., Ltd., and R. C. H. Russell.

613,797. **High-Tension Electric Cables.** Cie Generale D'Electricite.

614,213. **Inner Tubes.** A. H. Stevens (Firestone Tire & Rubber Co.).

614,217. **Flexible Mounting.** General Tire & Rubber Co.).

614,299. **Containers Such as Hot-Water Bottles and Ice-Bags.** F. Lobl.

614,797. **Resilient Mountings.** Hazeltine Corp.

641,836. **Resilient Mountings.** Metalastik, Ltd., A. J. Hirst, and R. N. Chambers.

615,057. **Inner Tubes.** D. J. Chappell.

615,076. **Safety Tubes for a Pneumatic Tire.** Dunlop Rubber Co., Ltd., H. R. Fletcher, and W. J. Mullins.

615,131. **Insulated Electric Cable and Insulation therefor.** Standard Telephones & Cables Ltd.

PROCESS

United States

2,457,963. **Small Discrete Particles of Carbon Black and Rubber.** G. Thodos, Bartlesville, Okla., assignor to Phillips Petroleum Co. a corporation of Del.

2,458,152. **Making Rivets from a Mixture of Rubber and Resin.** E. A. Eakins, Mishawaka, Ind., assignor to United States Rubber Co., New York, N. Y.

2,458,694. **Sponge Rubber Sheet Material.** E. A. Eakins, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

2,458,864. **Forming a Laminated Molded Structure.** J. D. Lindsay, Grosse Pointe Woods, Mich.

2,459,120. **Sponge Rubber Weather Strips.** L. Spraragen, assignor to Bridgeport Fabrics, Inc., both of Bridgeport, Conn.

2,459,279. **Plastic Coating.** R. W. Holden, assignor to Laminating Specialties, Inc., both of Burbank, Calif.

2,459,620. **Wear Resisting Fibrous Fabric Containing Fibrous Threads Bonded Firmly together with Rubber.** R. Cleeland, Meadowbrook, L. J. Kelley, Upper Darby, and W. S. Davis, Roxborough, all in Pa.

2,459,745. **Processing Rubber Compound.** H. H. Waters, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,748. **Continuous Method of Coagulating a Rubbery Butadiene-Styrene Copolymer Latex.** C. R. Johnson, assignor to Firestone Tire & Rubber Co., both of Akron, O.

Dominion of Canada

454,220. **Homogeneous Coating of a Synthetic Resin.** C. F. Lumb, Kingston Hill, Surrey, assignor to Schori Metallizing Process Ltd., London, both in England.

United Kingdom

613,506. **Shaping Sheets of Polymerized Unsaturated Esters of Polybasic Acids.** Pittsburgh Plate Glass Co.

613,635. **Extruding Articles from Multi-Colored Plastic Materials.** J. Delorme.

613,701. **Bonding Rubber-Like Materials to Metal.** United States Rubber Co.

614,358. **Production of Hollow Goods by Dipping.** Latex Industries, Ltd., and L. Landau.

614,401. **Bonded Laminated Materials.** Bakelite, Ltd.

614,412. **Tubular Containers Suitable for Use as Tire Curing Bags.** Firestone Tire & Rubber Co.

614,434. **Drying Rubber Latex by Treatment with Radio-Frequency Alternating Electric Currents.** International Latex Processes, Ltd., and W. Binns.

614,447. **Extruding Large-Size Tubes from Thermoplastics, Rubber, etc.** S. P. A. Lavorazione Materie Plastiche.

614,932. **Coating Textile Fabrics.** B. F. Goodrich Co.

615,046. **Rubber-Soled Shoes.** J. Hoza.

CHEMICAL

United States

2,457,872. **Vulcanizable Copolymer of a Vinyl Aryl Compound, Butadiene and a Maleic Ester.** G. F. D'Alelio, Cleveland, O. assignor to Pro-phy-lac-tic Brush Co., Northampton, Mass.

2,457,873. **Resinous Copolymerization Product of a Mixture of Butadiene-1,3, Acrylonitrile, and Ethyl Maleate.** G. F. D'Alelio, Cleveland, O., assignor to Pro-phy-lac-tic Brush Co., Northampton, Mass.

2,458,082. **Diolefins.** M. O. Kilpatrick, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,458,191. **Improving the Physical Properties of Lower Alkyl Acrylate and Lower Alkyl Methacrylate Polymers, Polystyrene and Polyvinyl Acetate by Mixing These Resins with an Allyl Starch Ether.** P. L. Nichols, Jr., and L. T. Smith, both of Philadelphia, Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.

2,458,221. **Treating Polychloroprene Sponge Rubber Containing Zinc Oxide to Reduce Its Odor and Surface Tack by Washing in an Aqueous Solution of Inorganic Chloride That Will React with Zinc Oxide.** E. C. Svendsen and W. J. Clayton, both of Mishawaka, Ind., assignors to United States Rubber Co., New York, N. Y.

2,458,222. **In the Manufacture of Artificial Aqueous Dispersions of Natural and Synthetic Rubbers, Rubber Substitutes and Rubber-Like Substances, the Process of Masticating the Materials in Plasticized Solid State in the Presence of a Small Amount of a Soap-Forming Acid Saponified in Part by an Amine Base and in Part by an Inorganic Alkali Metal Compound.** N. Talalay, Bedford, England.

2,458,351. **Hard Rubber Dust Filler Sub-**

stitute for Use with Natural and Synthetic Rubbers in Making Hard Material Which Consists of a Mill Ground Soft Vulcanized Rubber, the Particles Being Plastic on the Surface Only. L. J. Cukierski, Melrose Park, Ill., assignor to Richardson Co., Lockland, O.

2,458,378. **Separation of Metallic Sodium from a High Molecular Weight Organic Polymer Resulting from the Mass Polymerization of a Vinyl Compound with Metallic Sodium.** G. Herbelsheimer, assignor to Phillips Petroleum Co., both of Bartlesville, Okla.

2,458,432. **Polymerizing a Conjugated Diene Monomer in Aqueous Alkaline Medium in the Presence of an Ester of an Acyclic Aliphatic Monocarbothiolic Acid.** W. H. Sharkey, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,458,451. **Preparing a Sheet from a Polyvinyl Butyral Resin Mixed with a Melamine-Formaldehyde-Alcohol Condensation Product and Rendering It Non-Thermoplastic and Insoluble by Heating for 1-3 Hours at 105 to 125° C.** G. T. Vaala, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,458,456. **Continuous Emulsion Polymerization of a Conjugated Diolefin and a Monomer Containing an Active $CH_2=C_<$ Group.** I. L. Wolk, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,458,486. **Fusible and Readily Removable Protective Coating for Metal Articles, Including Ethyl Cellulose, Mineral Oil, and a Liquid Condensate of a Styrene or Styrene Derivative with Toluene or Xylene.** A. E. Young, assignor to Dow Chemical Co., both of Midland, Mich.

2,458,494. **Styrene Monomer Stabilized against Polymerization by the Addition of a Monosulfide of Mono Butylated Meta Cresol.** J. R. Durland, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,458,636. **Precipitating Polymer from Aqueous Emulsion.** L. Plambeck, Jr., assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,458,639. **Copolymer Consisting of Vinyl Chloride, Vinyl Acetate, Maleic Acid, Methyl Maleate, and Vinyl Alcohol.** R. W. Quarles, Pittsburgh, Pa., assignor to Carbide & Carbon Chemicals Corp., New York, N. Y.

2,458,764. **Concentrated Solution of Sulfur in Ethylene-Diamine.** H. Brunel, Paris, France.

2,458,780. **Rubber Composition Containing as Antioxidant a 5-Pyrazolone.** I. H. Howland, Watertown, Conn., assignor to United States Rubber Co., New York, N. Y.

2,458,841. **Natural or Synthetic Rubber Softened with Polyisobutylene Treated with a Mixture of Sulfur Dioxide and Chlorine and Reacted with Ammonia.** N. M. Elmore, Elizabeth, and A. M. Gessler, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,458,843. **Improving Cured Butyl Rubber for Pressure Working.** W. F. Fisher, Roselle Park, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,458,886. **Bonding Cellulose Products to Rubber by Surface Treating the Cellulose with a Compound of the Class of Di-Methylol Derivatives of Mono-Substituted Phenol, Mono-Methylol Derivatives of Double Substituted Phenol and Their Salts.** J. G. Weeldenburg, Velp, Netherlands, assignor to American Enka Corp., Enka, N. C.

2,459,109. **Direct Synthesis of Alkyl Substituted Styrene Polymers by Reacting Acetylene with an Alkylated Benzene in the Presence of a Catalyst, Including a Stable Aliphatic Ether-Boron Trifluoride Complex Saturated with Boron Trifluoride in the Presence of a Mercury Salt.** A. F. McKay, assignor to Dominion Tar & Chemical Co., Ltd., both of Montreal, P.Q., Canada.

2,459,125. **Film of Copolymer of Vinylidene Chloride and Vinyl Chloride.** LeV. E. Cheyney, assignor to Wingfoot Corp., both of Akron, O.

2,459,126. **Synthetic Rubber Obtained by Polymerizing in Aqueous Emulsion a Mixture of an Acrylonitrile with a Cracked Petroleum Fraction Containing Butadiene and Olefins of 3 to 5 Carbon Atoms.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,459,127. **Vinyl Chloride Resin Capable of Resisting Discoloration on Heating and Containing Zirconium Oxide.** F. W. Cox, Birmingham, Ala., and J. M. Wallace, Jr., assignors to Wingfoot Corp., both of Akron, O.

2,459,369. **Method of Extracting Rubber from Guayule Plants by Subjecting Comminuted Guayule Shrub to Extraction with a Water-Miscible Organic Solvent.** H. Tint and C. W. Murray, both of Salinas, Calif., assignors to the United States of America, as represented by the Secretary of Agriculture.

2,459,402. **Separating Isoprene and Trans-Piperylene from a Debutanized Refinery Cracked Stock by Extractive and Azeotropic Distillation.** G. L. Ahrens, Scotch Plains, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,459,410. **Azeotropic Distillation of 2,3-Dimethylbutadiene from Its Mixtures with Methyl Pentadiene.** R. C. Brandon, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,459,439. **Solid Rubbery Polymer from Acrylic Acids Reacted with Diisocyanates and Diisothiocyanates.** J. G. Lichty, Stow, and N. V. Seeger, Cuyahoga Falls, assignors to Wingfoot Corp., Akron all in O.

2,459,451. **Butadiene Extraction.** J. W. Packie, Green Village, and E. M. Glazier, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,459,488. **Polyvinyl Acetal Resins Produced from a Polyvinyl Alcohol and an Aldehyde.** K. F. Beal, Berwyn, and C. J. B. Thor, Western Springs, assignors to Visking Corp., Chicago, all in Ill.

2,459,501. **Soft, Elastic Rubbery Product from a Mixture of a Mono-Isoolefin and an Unsaturated Aliphatic Alcohol Ester of an Alpha Beta Olefin Dicarboxylic Acid Subjected to a Friedel-Crafts Catalyst at below −40° C.** J. M. Coon, Verona, and J. B. Rust, West Orange, both in N. J.

2,459,736. **Thiazyl Sulfenamides.** G. E. P. Smith, Jr., and E. L. Carr, assignors to Firestone Tire & Rubber Co., all of Akron, O.

2,459,739. **Elastomeric Copolymer Mixed with Phenol-Aldehyde Resin.** F. J. Groten, Montclair, and R. J. Reid, Fair Lawn, both in N. J., assignors to Firestone Tire & Rubber Co., Akron, O.

2,459,740. **Synthetic Rubber with Improved Processing Characteristics Obtained by Mixing an Aqueous Solution of a Soluble Aluminum Salt with an Aqueous Dispersion of a Synthetic Rubber Containing as a Dispersing Agent, Sodium Oleate or Sodium Stearate.** R. L. Bebb, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,742. **Adhering an Elastomer to a Metal by Means of a Chlorinated Rubber Adhesive Containing a Polyalkylene Polyamine.** H. P. Bradley, Cuyahoga Falls, and J. L. Dum, assignor to Firestone Tire & Rubber Co., both of Akron, both in O.

2,459,744. **Bonding Rubber to Magnesium and Its Alloys by Applying a Composition Consisting of a Polyhydric Alcohol Acidified by Concentrated Sulfuric Acid, Baking the Metal, and Applying an Adhesive Consisting of Chlorinated Rubber, Rubber Hydrochloride, or Isomerized Rubber, and Vulcanizing.** J. R. Rafter, Sharon, Mass., assignor to Firestone Tire & Rubber Co., Akron, O.

2,459,746. **Vinylidene Chloride Resins Stabilized Against Deterioration by Heat in the Presence of Iron and Compounds thereof.** M. R. Radcliffe, Glen Rock, N. J., assignor to Firestone Tire & Rubber Co., Akron, O.

2,459,754. **Purification of a Phenol Sulfide.** H. E. Albert, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,759. **N-Monochlorocyclohexylamine.** G. Alliger, Cuyahoga Falls, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,459,760. **Distilling 2,3-Dichlorobutadiene-1,3 through a Reflux Column, the Metallic Interior Surfaces of Which Are Coated with Sodium Silicate.** R. T. O'Donnell, Montclair, N. J., assignor to Firestone Tire & Rubber Co., Akron, O.

2,459,761. **Copolymer of Butadiene and Styrene Tackified by Incorporating Unvulcanized Oxidized Isoprene and Styrene Copolymer.** H. F. Palmer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,763. **Vulcanizing a Rubber in the Presence of Sulfur, a Thiazole Accelerator, and an Activator of the Class of Cyclohexylammonium and Dicyclohexylammonium Salts of a Cresol.** M. M. Heywood, Twickenham, England, assignor to Firestone Tire & Rubber Co., Akron, O.

2,459,874. **For Producing a Highly Abrasion-Resistant Artificial Leather, a First Coating Composition Including Copolymer of Butadiene and Acrylonitrile, Calcium Carbonate, Stearic Acid, Phenolic Resin, Zinc Oxide, Coumarone Resin, Benzothiazyl Disulfide, and a Second Coating Composition, Including Polymerized Chloroprene, Butadiene-Acrylonitrile Copolymer, Chlorinated Polyethylene, Release Agent, Zinc Oxide, Magnesium Oxide, Calcium Carbonate, Ground Leather, Light Process Petroleum Oil, Pigments, Benzothiazyl Disulfide, Sulfur, and Phenyl Salicylate.** R. E. Fay, Jr., Bridgeport, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,459,891. **Pressure-Sensitive Adhesive Mass, Including a Partially Cured Butadiene-Styrene Copolymer, Polyisobutylene, Tackifying Resin, Plasticizer, and Filler.** W. L. Nelson, Highland Park, and O. R. Sunnig, New Brunswick, both in N. J., assignors to Johnson & Johnson, a corporation of N. J.

2,459,916. **As a New Product, Butadiene-Styrene Copolymer Mixed with Magnesium Nitride Particles Coated with a Plasticizer for Synthetic Rubber.** A. C. Byrns, Los Altos, Calif., and G. von Stroh, Coatesville, Pa., assignors to Permanente Metals Corp., Oakland, Calif.

2,459,955. **Polyvinyl Acetate Emulsion Adhesive.** G. O. Morrison, T. P. G. Shaw, and J. D. P-E. Mercier, all of Shawinigan Falls, P. Q., Canada, and H. M. Collins, Stamford, Conn., assignors to Shawinigan Chemicals Ltd., Montreal, P.Q., Canada.

2,460,038. **Synthetic Rubber-Like Polymerizates of Good Processability Obtained by Polymerizing in Aqueous Emulsion a Butadiene-1,3 Hydrocarbon and Another Unsaturated Organic Compound, Using a Water Soluble Soap Emulsifier, a Hydrocarbon Soluble Peroxide, an Alkali Persulfate, a Mercapto Polymerization Modifier, and a Polyolefinic, Higher Fatty Acid in the Free State.** G. E. Serniuk, Roselle, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,460,041. **Lubricant Material Including a Mineral Oil Base Lubricating Material Having in Solution a Copolymer of Butadiene and Diisobutylene Treated with a Phosphorus Sulfide.** W. J. Sparks, Westfield, and D. W. Young, Roselle, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,460,105. **Photopolymerization of Vinylidene Compounds with Organic Disulfides.** L. M. Richards, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,460,177. **Preservation of Butadiene-Styrene and Butadiene-Acrylonitrile Copolymers by the Addition of Thioacetamide.** L. H. Howland, Waterbury, Conn., assignor to United States Rubber Co., New York, N. Y.

Dominion of Canada

452,860. **Adhesive Including a Concentrate Consisting Essentially of Lignosulfonic Acid Made from Waste Sulfite Liquors, Polyvinyl Alcohol, and Disodium Phosphate.** D. S. Bruce and H. L. Heise, assignors to Gummed Products Co., all of Troy, O., U.S.A.

452,888. **Cast Forming Material Impregnated with a Crystalline Organic Compound Intimately Admixed with a High Molecular Weight Thermoplastic Substance.** J. J. Eberl, Bound Brook, N. J., U.S.A., assignor to Johnson & Johnson, Ltd., Montreal, P.Q.

452,878. **Vulcanizing Rubber in the Presence of a Sulfur and a Condensation Product of a 2-Mercaptothiazole, Formaldehyde and Ammonia.** M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo., both in the U.S.A.

452,911. **Producing a Highly Active Plasticizing Agent from Alpha-Methyl Paramethyl Styrene by Polymerization Followed by Distillation.** S. J. Baum, Peabody, Mass., and W. D. Paist, Newark, N. J., assignors to C. Dreytus, New York, N. Y., all in the U.S.A.

452,961. **Production of Plastic Compositions from a Polyvinyl Halide or Polyvinyl Halide Copolymer in Which the Plasticizer Is a Hydrocarbon Extracted from a Mineral Oil Fraction or Residue with a Selective Polar Solvent and Chlorinated.** E. W. M. Fawcet and E. S. Narracott, Sunbury-on-Thames, Middlesex, assignors to Anglo-Iranian Oil Co., Ltd., London, both in England.

452,973. **Treating Linear Polymers with Formaldehyde or Formaldehyde-Liberating Substances.** D. A. Harper and R. J. W. Richards, Blackley, Manchester, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

452,974. **Obtaining Elastic Nylon Articles by Heating under Anhydrous Conditions in Contact with an Acidic Catalyst, a Volatile Monohydric Alcohol in Vapor Form and Formaldehyde in Vapor Form.** J. R. Lewis, D. McCreath, and R. J. W. Reynolds, Blackley, Manchester, England, assignors to Canadian Industries Ltd., Montreal, P.Q.

453,064. **Polymerized Alpha Hydrocarbonoxy-Substituted Acrylonitrile.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

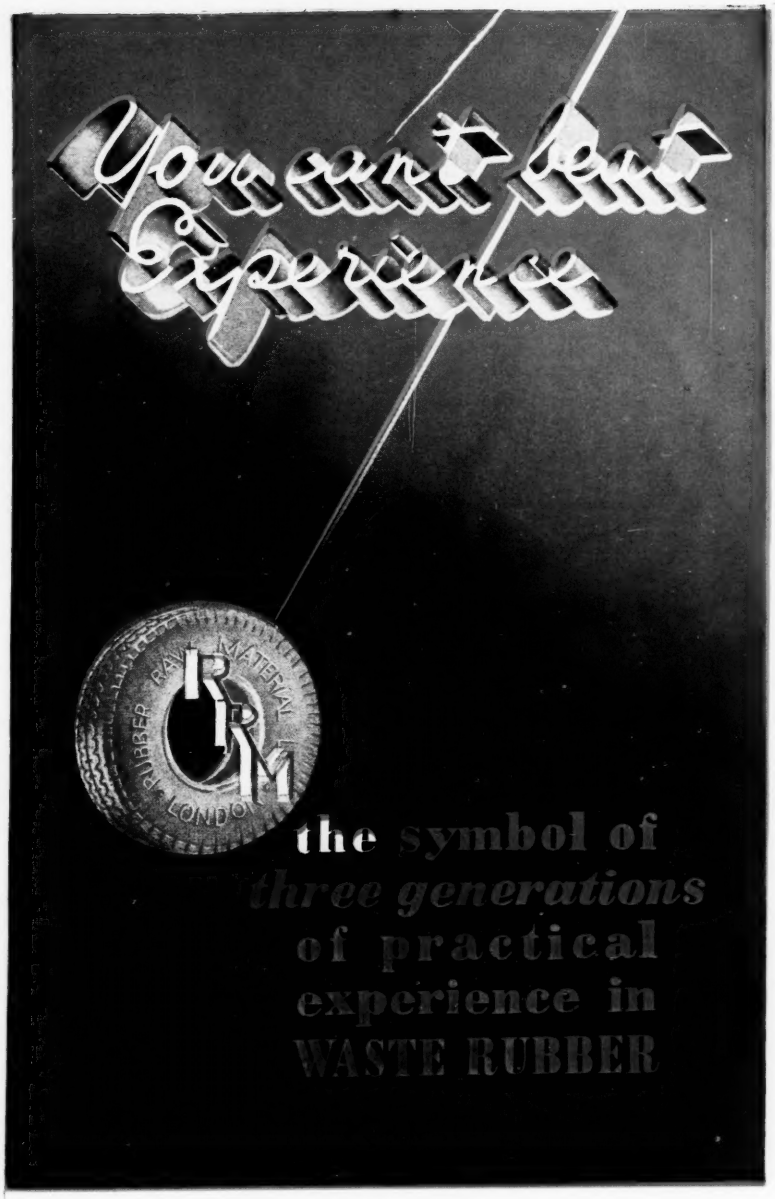
453,065. **A Copolymer of Orthocyanostyrene and Butadiene-1,3.** J. R. Long, Stow, O., assignor to Wingfoot Corp., Akron, O., U.S.A.

453,118. **Production of an Unsaturated Aliphatic Compound by Reacting a Metal Chlorosulfonate with a Hydroxy Aliphatic Compound.** P. M. Kirk, Stamford, and L. C. Jones, Greenwich, both in Conn., assignors to American Cyanamid Co., New York, N. Y., U.S.A.

453,119. **Making Chloroacetonitrile by Treating Glycolonitrile in the Presence of an Organic Base with an Acid Chloride.** I. Hechenbleikner, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

453,122. **Diarylguanidine Thiazole Formaldehyde Complex.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

453,140. **Condensation of Organo-Silicols.** E. G. Rochow, West Albany, N. Y., U.S.A.,



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453,155. **Polymerizing Styrene and Related Compounds by Heating in the Presence of a Peroxidic Catalyst Containing a Radical of an Unsaturated Organic Acid of the Group of Crotonic and Cinnamic Acid and in the Presence of a Diluent.** H. P. Staudinger, Ewell, Surrey, England, assignor to Distillers Co., Ltd., Edinburgh, Scotland.

453,160. **Tire Curing Bag Formed from a Composition Including a Rubber Stock in Which Is Incorporated from 30 to 75 Parts by Weight of Acetylene Carbon Black to Increase the Thermal Conductivity of the Bag.** D. R. Elliott and K. K. Madison, Detroit, Mich., U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,161. **Light Stable Composition, Including Polymeric Vinylidene Chloride.** T. Houtman, Jr., assignor to Dow Chemical Co., both of Midland, Mich.

453,162. **In Polymerizing in Aqueous Medium a Chloroethylene, the Steps of Adding to the Aqueous Medium before Polymerization an Aqueous Slurry of Metal Silicate Particles and Carrying Out the Polymerization in the Additional Presence of a Mixture of an Emulsifier and Bentonite Clay.** C. H. Alexander, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

453,174. **Thiophene.** M. H. M. Arnold, Norton-on-Tees, Durham, assignor to Imperial Chemical Industries, Ltd., London, both in England.

453,250. **Heterogeneous Rubber Compound for Use in Tire Treads and the Like and Including a Continuous Phase of Natural Rubber Compound, a Disperse Phase Consisting of Finely Divided Synthetic Polymer Stiffened with Carbon Black, and a Blended Interface; the Polymer Is the Product Resulting from the Polymerization of an Aliphatic Diene with Conjugated Double Bonds.** T. A. Te Grotenhuis, Olmsted Falls, O., U.S.A.

453,251. **Latex Coagulum, Including a Latex of a Relatively Tough Polymer of a Material Including a Butadiene Compound and Containing Carbon Black Mixed with a Latex of a More Plastic Vulcanizable Polymer and Including a Butadiene and a Modifier.** T. A. Te Grotenhuis, Olmsted Falls, O., U.S.A.

453,325-326. **Ethylene Oxide.** H. deV. Finch, El Cerrito, and I. Bergstrasser, Torrance, assignors to Shell Development Co., San Francisco, all in Calif., U.S.A.

453,391. **Plasticizing Rubber and Synthetic Rubber-Like Materials by Mixing with Such Materials an Alkylthiosuccinate.** R. T. Dean, Stamford, and E. O. Hook, Riverside, Conn., assignors to American Cyanamid Co., New York, N. Y., U.S.A.

453,392. **Plasticizing Rubber and Synthetic Rubber-Like Materials by Mixing with a Substituted Oxysuccinic Acid Ester.** R. T. Dean, Stamford, and E. O. Hook, Riverside, Conn., assignors to American Cyanamid Co., New York, N. Y., U.S.A.

453,393. **Plasticizing Rubber and Synthetic Rubber-Like Materials by Mixing with a Thiodipropionic Acid Ester.** R. T. Dean, Stamford, and E. O. Hook, Riverside, Conn., assignors to American Cyanamid Co., New York, N. Y., U.S.A.

453,443. **Modification of Low-Molecular Weight Linear Polyesters and Polyester-Amides.** D. B. Coffey, J. G. Cook, and W. H. G. Lake, all of Blackley, Manchester, England, assignors to Canadian Industries Ltd., Montreal, P.Q.

453,444. **Curing an Organic Diisocyanate Modified Polyester or Polyester-Amide with a Non-Phenolic Formaldehyde Liberating Substance, a Curing Catalyst and a Thermo Hardening Phenol-Formaldehyde Condensation Product.** W. Furness, L. F. Perrins, and W. F. Smith, Blackley, Manchester, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

453,446. **Process for Applying Polymers and Interpolymers of Vinyl Chloride to Surfaces.** G. C. Tyce, Watford, Hertford, England, assignor to Canadian Industries, Ltd., Montreal, P.Q.

453,476. **Interpolymerizate of Substantially Equimolar Amounts of Maleic Anhydride and Methallyl Alkyl Ether.** R. T. Armstrong, Johnson City, Tenn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,477. **Vulcanized Guayule having Physical Properties Approaching Those of Ordinary Plantation Rubber Obtained by Curing Deresined Guayule with the Aid of Zinc Oxide, Primary Organic Accelerator, and a Combination of an Activating Organic Amine and a Monobasic Fatty Acid or Zinc Salt thereof.** J. W. Temple, G. R. Cuthbertson, and R. R. Miller, all of Detroit, Mich., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,478-479. **Reducing the Rate of Cure of a Synthetic Rubber Vulcanized with an Oxidizing Agent and a Member of the Quinone Dioximino Class of Vulcanizing Agents by also Adding a Tetraalkyl or Tetramethyl Thiuramdisulfide.** R. R. Sterrett, Totowa, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

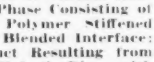
453,480. **Reducing the Rate of Cure of Butyl Rubber Vulcanized with a Quinone Dioximino Vulcanizing Agent, by Adding before Cure an Aryl Polycarboxylic Acid or Anhydride thereof.** R. R. Sterrett, Totowa, N. J., and F. L. Holbrook, Naugatuck, Conn., both in the U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,503. **Vulcanization of Butadiene-Acrylonitrile Copolymers in the Presence of a Bis(oxythiono) Polysulfide.** D. E. Sauser, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

453,616. **Styrene and Ethylbenzene.** C. Weizmann, London, England.

453,623. **A Polyamide Which Is the Heat Reaction Product of a Polyamine with Carboxylic Acids Obtained from Polymerized Methyl Esters of Tung Oil.** T. F. Bradley, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

453,656. **Vulcanizing Rubber by Incorporating Sulfur, a Primary Accelerator, and, a Compound of the Formula**



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453,675. **Polymerizing an Aqueous Emulsion Containing Butadiene-1,3 and Styrene Monomers and a Dimethylamine Soap of a Soap-Forming Monocarboxylic Acid Having 15 to 20 Carbon Atoms.** L. M. White, Nutley, N. J., U.S.A., assignor to International Latex Processes, Ltd., London, England.

453,676. **Recovering a Stable Liquid Composition from an Ungelled Polychloroprene Latex Foam Containing Zinc Oxide and Alkali Silicofluoride.** N. A. Klemp, Mishawaka, Ind., U.S.A., assignor to International Latex Processes, Ltd., London, England.

453,695. **Preserving Rubber by Treating with Condensation Product of an Aliphatic Ketone and a Primary Amine.** J. R. Ingram, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo., U.S.A.

453,725. **Recovering Isoprene and Piperylene from Hydrocarbon Mixtures Containing the Same.** R. C. Morris and H. DeV. Finch, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., U.S.A.

453,730. **Color Stable Resin Which Includes a Vinyl Chloride Polymer and Formamide.** LaV. E. Cheyney and C. R. Parks, assignors to Wingfoot Corp., all of Akron, O., U.S.A.

453,737. **Alpha, Beta-Dichloroacrylophenone.** J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

453,738. **Polymeric Material Obtained by Reacting One to Two Mols of Acrylic Acids with One Mol of Hexamethylene Diisocyanate at between 100-150° C.** J. G. Lichty, Stow, and N. V. Seeger, Cuyahoga Falls, assignors to Wingfoot Corp., Akron, all in O., U.S.A.

453,739-740. **Color Stabilization of Vinyl Halide Resins.** F. W. Cox, Cuyahoga Falls, and J. M. Wallace, Jr., assignors to Wingfoot Corp., both of Akron, both in O., U.S.A.

453,750. **Manufacture of Sponge Rubber from a Mixture of Latex, Aqueous Dispersion of Vulcanizing Accelerators and a Fine Dispersion of Solid Particles of Stearic Acid in an Aqueous Soap thereof.** W. Binns, Harrogate, Yorkshire, England.

453,791. **A Co-Dimer of Chlorotrifluoroethylene and 1,1-Dichloro-2,2-Difluoroethylene.** E. L. Kropa, Old Greenwich, and J. J. Padbury, Stamford, both in Conn., assignors to American Cyanamid Co., New York, N. Y., both in the U.S.A.

453,831. **Accelerating the Cure of Neoprene by the Incorporation of a 3,3,3'3'-Tetra-Alkyl-1,1 Spirobisindane-5,5',6,6'-tetrol.** B. W. Bender, Wanaque, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

453,832. **Derivatives of Guanidine Obtained by Allowing Nitrous Acid to React with an Aryl Guanidine.** J. A. Teicher and D. F. Twiss, both of Birmingham, England, assignors to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

453,833. **Impregnating Textile Fabrics, Cords, and Yarns with an Aqueous Dispersion of Rubber Hydrocarbons and Phenolic Resin Forming Reagents and Subjecting to Dry Steam.** J. W. Illingworth, Birmingham, England, assignor to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

453,842. **Magnesium Sulfate Coagulum of Zinc Oxide and Copolymer of Butadiene-Styrene.** W. E. Kaswell, Lakewood, and J. R. Laman, assignors to Firestone Tire & Rubber Co., both of Akron, both in O., U.S.A.

453,991. **Dimethyl Silicone Elastomers Containing Lead Monoxide.** J. Marsden and G. F. Roedel, both of Schenectady, N. Y., U.S.A., assignors to Canadian General Electric Co., Ltd., Toronto, Ont.

454,013. **Curing Acrylic Ester Polymers by Heating with an Oxide of Lead.** S. T. Semegen, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y., U.S.A.

454,126. **Preparation of Piperazine.** H. F. Pfann, Aliquippa, Pa., assignor to American Cyanamid Co., New York, N. Y., U.S.A.

454,145. **Cellular Hard Rubber.** G. M. Hamilton, assignor to Callenders' Cable & Construction Co., Ltd., in voluntary liquidation by Hockley, assignor to British Insulated Callenders' Cables, Ltd., all of London, England.

454,224. **Polymerizing Styrene Mixed with Beta-Naphthol by Exposure to Actinic Light Rich in Ultra-Violet Radiation.** D. E. Adelson and H. Dannenberg, Berkeley, assignors to Shell Development Co., San Francisco, Calif., U.S.A.

454,231. **Monomeric Butadiene Stabilized with Methyl Salicylate.** L. F. Hatch, Austin, Tex., and D. E. Adelson and B. O. Blackburn, both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., both in the U.S.A.

454,232. **Monomeric Butadiene Stabilized with 4-Tertiary-Butyl Catechol.** L. F. Hatch, Austin, Tex., and D. E. Adelson and B. O. Blackburn, both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., both in the U.S.A.

454,233. **Monomeric Butadiene Stabilized with Para-Amino-Phenol.** L. F. Hatch, Austin, Tex., and D. E. Adelson and B. O. Blackburn, both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif., both in the U.S.A.

United Kingdom

611,109. **Manufacture of Interpolymers of Styrene with Drying Oil Fatty Acids and Derivatives thereof.** L. Berger & Sons, Ltd., J. A. Cottrell, and D. H. Hewitt.

611,113. **Preparation of Granular Polyvinyl Ethers.** General Aniline & Film Corp.

611,156. **Plasticizing of Rubber and Rubber-Like Materials.** J. C. Arnold (Standard Oil Development Co.).

611,157. **Styrene Copolymers.** J. C. Arnold (Standard Oil Development Co.).

611,164-165. **Natural or Synthetic Rubber Sponge.** International Latex Process, Ltd.

611,214. **Resinous Condensation Products.** Monsanto Chemical Co.

611,255-256. **Low-Temperature Polymerization of Olefins.** Distillers Co., Ltd., M. D. Cooke, and J. J. P. Staudinger.

611,300. **Molding Composition.** Shawinigan Products Corp.

611,303. **Olefinic Nitriles.** American Cyanamid Co.

611,425. **Preparing Organo-Silicon Esters.** J. G. Fife (Dow Chemical Co.).

611,494. **Chlorinated Methylpolysiloxanes.** British Thompson-Houston Co., Ltd.

611,495. **Treatment of Chloromethyl-Substituted Polysiloxanes.** British Thomson-Houston Co., Ltd.

611,501. **Sulfurized Oils.** J. C. Arnold (Standard Oil Development Co.).

611,529. **Unsaturated Polyesters and Polymers thereof.** B. F. Goodrich Co.

611,562. **Plasticized Resinous Compositions.** Bakelite, Ltd., J. E. H. Hayward, and P. H. Calderbank.

611,612. **Treatment of Polysulfide Polymers.** Thiokol Corp.

611,642. **Composite Materials Containing Hydrocarbon Copolymers and Bituminous Materials.** J. C. Arnold (Standard Oil Development Co.).

611,700. **Organo-Siloxanes.** Corning Glass Works.

611,796. **Improving the Physical Characteristics of Vinyl Resin Filaments, Threads, Yarns, and the Like.** Carbide & Carbon Chemicals Corp.

611,830. **Emulsion Polymerization of Vinyl Compounds.** Wolsey, Ltd., and P. Alexander.

611,851. **Chlorinated Heterocyclic Compounds.** E. I. du Pont de Nemours & Co., Inc.

611,904. **Aqueous Emulsions of Polyvinyl Compounds.** Vinyl Products, Ltd., J. E. O. Mayne, and H. Reichard.

611,915. **Synthesis of Vinyl Chloride.** Solvay & Cie.

611,919. **Valuable Reaction Products of High-Molecular Unsaturated Substances Containing More Than One Unsaturated Grouping in the Molecule with Inorganic Acids or Acid Anhydrides.** N. V. de Bataafsche Petroleum Mij.

611,990. **Impregnating Compositions.** Bakelite Corp.

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612,125. **Higher Alkoxy Silicon Halides and Materials Treated Therewith.** J. G. Fife (Dow Chemical Co.).

612,166. **Synthetic Resins.** British Resin Products, Ltd., E. M. Evans, and H. Thurston-Hookway.

612,252-253. **Stabilized Synthetic Rubber Latices.** C. Arnold (Standard Oil Development Co.).

612,266. **Polymerization and Interpolymerization of Ethylene.** E. I. du Pont de Nemours & Co., Inc.

612,271. **Beta-Halo Acyl Halides.** B. F. Goodrich Co.

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612,302. **Electrical Insulating Material.** British Insulated Callender's Cables, Ltd., D. C. Hancock, and D. T. Hollingsworth.

612,311-312. **Polymerizable Esters.** L. Berger & Sons, Ltd., F. Armitage, J. A. Cottrell, and D. H. Hewitt.

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612,331. **Polymerization of Polymerizable Substances in the Form of an Emulsion.** N. V. De Bataafsche Petroleum Mij.

612,416. **Synthetic Resin Composition.** Anglo-Iranian Oil Co., Ltd., E. S. Narracott, and K. J. Rowland.

612,429. **Isoprene.** Rubber-Stichting.

612,443. **Treatment of Natural Rubber Latices.** J. W. Van Dalfsen.

612,559. **Amino-Acids for Use in the Production of Polymeric Materials.** J. Lincoln.

612,589-590. **Vinyl Cyanide.** E. I. du Pont de Nemours & Co., Inc.

612,605. **Coating Compositions Containing Thermoplastic Resins.** F. R. Stoner, Jr., and D. M. Gray.

612,609. **Polymeric Materials.** R. W. Moncrieff.

612,646. **Silicone Intermediates.** Metropolitan-Vickers Electrical Co., Ltd., and R. W. Bailey.

612,697. **Polyvinyl Resin Compositions.** Soc. des Usines Chimiques Rhone-Poulenc.

612,772. **Factice.** Anchor Chemical Co., Ltd., and K. C. Roberts.

612,822. **Organo-Substituted Silicon Compounds.** Revertex, Ltd., C. Bondy, K. Reiser, and A. H. Campbell.

612,843. **Synthetic Resinous Products.** Distillers Co., Ltd., L. Dennis, and T. W. M. Pond.

612,893. **Production of Cyclopentadiene.** P. F. C. Sowter and W. A. Rogerson.

613,018. **Polythene Compositions.** Imperial Chemical Industries, Ltd., and W. E. F. Gates.

613,020. **Polymeric Materials.** J. W. Fisher, E. W. Wheatley, and H. Bates.

613,076. **Condensation Products Derived from Naphthoquinoneimides.** P. May (Sandoz, Ltd.).

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613,121. **Synthetic Rubber Compositions.** Firestone Tire & Rubber Co.

613,219. **Hydrogenation of Dimeric Alpha-Methyl Para-Methyl Styrene.** Standard Telephones & Cables, Ltd.

613,180. **Thermosetting Compositions.** E. I. du Pont de Nemours & Co., Inc.

613,497. **Polymeric Material.** J. W. Fisher, E. W. Wheatley, and H. Bates.

613,509. **Olefin Polymerization.** Phillips Petroleum Co.

613,650. **Coating and Impregnating Compositions.** British Thomson-Houston Co., Ltd.

613,817-818. **Production or Treatment of Cellulose Derivative or Synthetic Resin Materials.** J. G. N. Drewitt and H. K. Stephens.

613,820. **Orienting Crystalline Resinous Bodies.** A. H. Stevens (Firestone Tire & Rubber Co.).

613,834. **Vinyl Esters or Ethers and Their Homologs.** Gevaert Photo-Producten, N. V.

613,878. **Resinous Materials.** Distillers Co., Ltd., and L. Dennis.

613,880. **Polymerization in the Presence of Copper or a Copper Alloy.** British Thomson-Houston Co., Ltd.

613,931. **Synthetic Resin Bonding Agents.** Imperial Chemical Industries, Ltd., T. J. Meyrick, J. A. Moyse, and E. G. Barry.

613,932. **Preparation of Resinous Interpolymers.** Firestone Tire & Rubber Co.

613,953. **Preparation of Resin Compositions.** Firestone Tire & Rubber Co.

613,963. **Polymerization of Unsaturated Compounds.** E. I. du Pont de Nemours & Co., Inc.

613,977. **Stabilized Synthetic Resins.** E. I. du Pont de Nemours & Co., Inc.

613,986. **Polymer Compositions and the Production of Shaped Articles.** J. W. Fisher, E. W. Wheatley, and H. Bates.

614,037. **Condensation Products of a Phenol, and Aldehyde, and a Melamine.** British Industrial Plastics, Ltd.

614,154. **Polymerization of Styrene and Like Compounds.** Distillers Co., Ltd., G. P. Armstrong, R. R. Smith, and J. J. P. Staudinger.

614,190. **Copolymers of Vinyl Esters with Dihydropyran.** E. I. du Pont de Nemours & Co., Inc., and N. W. Flodin.

614,198. **Polymerization of Organic Compounds.** Distillers Co., Ltd., H. M. Hutchinson, R. R. Smith, and J. J. P. Staudinger.

614,212. **Vulcanization of Natural and Synthetic Rubbers.** Ridbo Laboratories, Inc.

614,215. **Polyureas.** Imperial Chemical Industries, Ltd., L. Bradford, W. Charlton, H. Plimmer, and E. B. Robinson.

613,235. **Unsaturated Diesters.** B. F. Goodrich Co.

614,265. **Compositions Containing Water-Insoluble and Water-Soluble Organic Polymers.** E. I. du Pont de Nemours & Co., Inc.

614,291. **Deposition of Metallic Films on the Surface of Natural and Synthetic Rubbers.** Andre Rubber Co., Ltd., and S. Buchan.

614,295. **Organic Polycarbamates.** Imperial Chemical Industries, Ltd., W. Baird, P. Gaubert, and A. Lowe.

614,303. **Polyvinyl Compositions.** Soc. des Usines Chimiques Rhone-Poulenc.

614,307. **Stabilization of Aqueous Anionic Dispersion of Partially Polymerized Dimethylol Urea.** American Cyanamid Co.

614,458. **Expanded Thermoplastic Materials.** Expanded Rubber Co., Ltd., and S. Booth.

614,515. **Catalytic Polymerization of Ethylene.** E. I. du Pont de Nemours & Co., Inc.

614,533. **Copolymers of Cyclopentadiene and Styrene.** Resinous Products & Chemical Co.

614,538-539. **Polyallyl Derivatives.** British Resin Products, Ltd., E. M. Evans, and H. Thurston-Hookway.

614,762. **Dispersions of Polymeric Materials.** E. I. du Pont de Nemours & Co., Inc.

614,829. **Compositions Including Polymeric Materials.** Imperial Chemical Industries Ltd., H. G. White, and W. F. Smith.

614,916. **Unsymmetrically Substituted Guanidines and Salts thereof.** American Cyanamid Co.

614,991. **Polyester-Amide Compositions for Coating, Impregnating, Adhesive, and Like Purposes.** Imperial Chemical Industries, Ltd., J. G. Cook, J. T. Watts, and H. G. White.

614,992. **Curing Polymeric Materials.** Imperial Chemical Industries, Ltd., D. H. Coffey, W. F. Smith, and H. G. White.

614,993. **Treatment of Polymeric Materials.** Imperial Chemical Industries, Ltd., D. A. Harper, B. J. Habgood, and R. J. W. Reynolds.

614,994. **Curing Polymeric Materials.** Imperial Chemical Industries, Ltd., D. A. Harper, and H. P. W. Huggill.

615,079. **Hydrolysis of Polyvinyl Esters.** E. I. du Pont de Nemours & Co., Inc.

615,125. **Dispersions of Polymeric Materials.** E. I. du Pont de Nemours & Co., Inc.

MACHINERY

United States

2,458,126. **Tire Tube Tester.** W. Abner, Burbank, Calif.

2,458,182. **Molding Apparatus.** F. J. MacDonald, Brookline, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,458,196. **Device to Determine the Cutting and Chipping Resistance of Plastic and Rubber-Like Materials.** W. E. Phillips, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,459,236. **High-Frequency Electrical Bonding Apparatus for Bonding Wide Layers of Dielectric Material.** G. H. Brown, Princeton, N. J., assignor to Radio Corp. of America, a corporation of Del.

2,459,504. **Wire Spreader and Tensioner for Circular Looms, Etc.** A. De Ghetto, Clifton, N. J., assignor to National Rubber Machinery Co., Akron, O.

2,459,606. **Inner Tube Tester.** L. H. Wink, Leesburg, Fla.

2,459,738. **Cord Tester.** I. B. Prettyman and G. P. Bosomworth, both of Akron, and D. C. Milner, Barberton, assignors to Firestone Tire & Rubber Co., Akron, both in O.

2,459,749. **Dial Gage.** G. P. Bosomworth, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,459,877. **Apparatus for Making Multiply Cable Sheaths.** R. Gillis, Westfield, N. J., assignor to Western Electric Co., Inc., New York, N. Y.

2,460,007. **Sheet Gripping and Pulling Tool.** Y. H. Hasselquist, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,460,107. **Wire and Cable Tester.** H. B. Slade, assignor to Okonite Co., both of Passaic, N. J.

Dominion of Canada

453,370. **Extrusion Molding Apparatus.** L. B. Green, Lakewood, O., U.S.A.

453,472. **Tire Repair Clamp.** J. C. Crowley, Willoughby, assignor to Dill Mfg. Co., Cleveland, both in O., U.S.A.

453,439. **Cable Stripper.** F. L. Churnall, Bloomfield, N. J., assignor to Federal Telephone & Radio Corp., New York, N. Y.

453,493. **Equipment to Form a Butadiene-Styrene Rubber Crumb.** J. T. Cox, Jr., Lake Charles, La., U.S.A., and D. A. Miller, Monrovia, Liberia, assignors to Firestone Tire & Rubber Co., Akron, O., U.S.A.

453,803. **Machine to Join Superimposed Layers of Thermoplastic Material.** J. C. Quayle, Helsby, and P. Jones, Kelsall, assignors to British Insulated Callenders' Cables, Ltd., London, all in England.

453,834. **Apparatus for Treating Cord with Liquid.** G. C. Brentnall and H. Smith, both of Birmingham, England, assignors to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

453,922. **Tire Treader.** J. H. F. Kent, assignor to himself and to Auto Tire Services, Ltd., both of Basingstoke, Hampshire, England.

454,014. **Apparatus for Mold-Vulcanizing Articles of Rubber-Like and Other Thermoplastic Materials.** C. W. Leguillon, Akron, O., G. L. Matthias, San Juan Capistrano, Calif., and E. Herzog, Cuyahoga Falls, O., assignors to B. F. Goodrich Co., New York, N. Y., all in the U.S.A.

454,146. **Device to Cover a Number of Conductors by the Longitudinal Method.** J. Taylor, T. L. Osborne, and E. Tunnicliff, Leigh, assignors to British Insulated Callender's Cables, Ltd., London, all in England.

454,212. **Injection Molding Machine.** R. V. Beshgetoor, Camden, and J. S. Bokeeno, Sewell, both in N. J., assignors to Radio Corp. of America, New York, N. Y., both in the U.S.A.

454,251. **Apparatus for Injection Molding Organic Plastic Material.** R. P. Piperoux, Newark, N. J., assignor to C. Dreyfus, New York, N. Y., both in the U.S.A.

United Kingdom

611,123. **Tire Repairing Apparatus.** Dunlop Rubber Co., Ltd., and T. Norcross.

611,645. **Apparatus for Heating Insulating Material by Subjecting It to a High-Frequency Field of Electric Force.** British Insulated Callender's Cables, Ltd., J. C. Quayle and P. Jones.

612,173. **Vulcanizing Apparatus, Particularly for Footwear.** United States Rubber Co.

612,509. **Apparatus for Producing Crumb Rubber from a Butadiene-Styrene Copolymer.** Firestone Tire & Rubber Co.

612,586. **Mechanism for Separating by Cutting Rubber Tire Stock and the Like into Unlike Components.** Wingfoot Corp.

613,173. **Spinning Apparatus for Use in the Production of Casings for Pneumatic Tires.** Dunlop Rubber Co., Ltd., and L. S. Blanchard.

UNCLASSIFIED

United States

2,458,642. **Automobile Tire Chain Ring.** C. H. Reynolds, assignor of 49% to P. Girman, both of Donora, Pa.

2,459,225. **Method of Controlling High-Frequency Heating of Dielectric Material.** W. H. Hickok, assignor to Girdler Corp., both of Louisville, Ky.

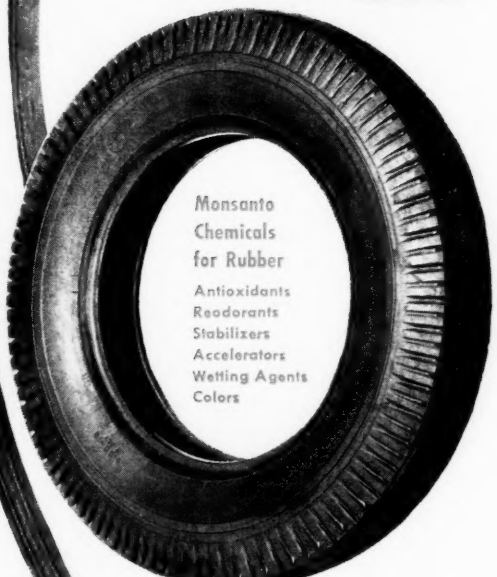
2,459,373. **V-Belt Clutching Device.** W. W. Gettys, Greeley, Colo.

2,459,752. **Attachment for a Synthetic Rubber Fitting of a Fuel Cell.** R. F. Wilson, San Gabriel, and A. F. Reznicek, Alhambra, both in Calif., assignors to Firestone Tire & Rubber Co., Akron, O.

2,460,029. **Russian Dandelion Seed Harvester.** R. M. Ramp, Houma, La., assignor to the United States of America, as represented by the Secretary of Agriculture.

SANTOFLEX B

protects rubber stocks against oxidation and flex cracking



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SERVING INDUSTRY... WHICH SERVES MANKIND

United Kingdom

611,838. **Clip for Securing Electric Cables, Etc., to Metal Girders.** British Insulated Callender's Cables Ltd., and S. J. Bryce.

611,889. **Universal Couplings or Joints.** General Tire & Rubber Co.

611,461. **Wheels for Vehicles.** Wingfoot Corp.

611,489. **Wheel Fairing.** Wingfoot Corp.

611,543. **Traction Apparatus for Endless Track Vehicles.** B. F. Goodrich Co.

611,559. **Tire Carrying Rims for Vehicle Wheels.** Kelsey-Hayes Wheel Co.

611,576. **Machines for Doubling or Twisting Yarns, Threads, Etc.** Dunlop Rubber Co., Ltd., and M. Langstreth.

612,059. **Electric Cable Joints and Terminations.** W. T. Glover & Co., Ltd., E. L. Davey, and F. R. Credland.

612,104. **Spring Insertion for Cushions, and the Like.** Hungarian Rubber Goods Factory Ltd.

612,172. **Separable Slide Fastener.** United States Rubber Co.

612,276. **Measuring Device for Twin Tires.** Dunlop Rubber Co., Ltd., A. H. George, and J. H. Hardman.

612,699. **Apparatus for Measuring the Camber, Castor Angle, and King-Pin Inclination of a Vehicle Wheel.** Dunlop Rubber Co., Ltd., and J. H. Hardman.

612,700. **Rims for Motorcycles, Cycles, and the Like.** Dunlop Rubber Co., Ltd., and P. B. Chatterton.

613,174. **Testing by Immersion of Inflatable Tubes and the Like.** Dunlop Rubber Co., Ltd., and W. Cooper.

613,666. **Means to Protect the Tire of Motor and Other Wheeled Vehicles.** W. C. Carlton.

614,785. **Cycle Tire Inflater.** Bluemel Bros., Ltd., and F. W. Bluemel.

615,039. **Boot Last for High-Legged Boots.** Dunlop Rubber Co., Ltd., F. Bridgman, and L. Phillips.

615,099. **Stripping Devices for Cables.** Johnson & Phillips Ltd., and W. J. Welsh.

615,153. **Pneumatic Tire Inflater.** Birmingham Small Arms Co., Ltd., and P. D. Comery.

TRADE MARKS

United States

441,749. **Super Flex.** Vehicle suspensions for use on aircraft. Firestone Tire & Rubber Co., Akron, O.

441,750. **Vintex.** Polyvinyl resin sheets. Middletown Rubber Corp., Middletown, Conn.

441,766. **Koroseal.** Resinous plastic material. B. F. Goodrich Co., Akron, O.

441,768. Representation of a duck and the words: **"The Dri-Duck."** Reticules or utility bags. Royal Dalton, Ltd., St. Louis, Mo.

441,769. **Abril.** Adhesives. Abril Corp. (Gt. Britain) Ltd., London, England.

441,771. **Plycozite.** Adhesives. United States Plywood Corp., New York, N. Y.

441,779. Representation of a diamond containing an inner diamond and the letters: **"NRK."** Injection molding machines. N. R. K. Mfg. & Engineering Co., assignor to N. R. K. Mfg. & Engineering Co., both of Chicago, Ill.

441,783. **Barraglaze.** Plastic coated textile fabrics. Barret Textile Corp., New York, N. Y.

441,796. **Hurricane.** Cleaning composition for tires, etc. L. J. Wilhartz, doing business as Lakeside Products, Chicago, Ill.

441,797. **Underseal.** Rubberized coating material. Minnesota Mining & Mfg. Co., St. Paul, Minn.

441,811. Representation of a gun and a powder horn and the word: **"Bobrich."** Raincoats. Bobrich Mfg. Corp., New York, N. Y.

441,816. **"Acme for Backing."** Cotton drill. Acme Backing Corp., New York, N. Y.

441,871. **Advawet.** Wetting agents. Advance Solvents & Chemical Corp., New York, N. Y.

504,404. **Wave-Rite.** Combs. Vulcanized Rubber & Plastics Co., New York, N. Y.

504,416. **Oil Country.** Transmission belts. Thermoid Co., Trenton, N. J.

504,445. **Lifetime.** Dress shields. Rand Rubber Co., Brooklyn, N. Y.

504,446. **Compensated.** Belting and hose. Raybestos-Manhattan, Inc., Passaic, N. J.

504,454. Representation of a broken-line circle containing the words: **"Titan Besly."** Grinding disks and wheels. Charles H. Besly & Co., Chicago, Ill.

504,479. **Santophobe.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

504,503. **Clarknit.** Foundation garments, girdles etc. David Clark Co., Inc., Worcester, Mass.

504,534. Representation of two blocks one, containing the letter: **"H"** and the other the letter: **"R."** Protective sheeting for hoses. Holland-Rantos Co., Inc., New York, N. Y.

504,564. **Emerald Cord.** Hose. Goodyear Tire & Rubber Co., Akron, O.

504,626. **Danoflex.** Rubber sheets and slabs. Danbury Rubber Co., Inc., Danbury, Conn.

504,677. **Resiloid.** Plastic film. Resiloid Corp., Brooklyn, N. Y.

504,716. Representation of a triangle containing two hands and across which is the word: **"Holdrite."** Brake band linings and blocks. American Mfg. & Sales Co., Tulsa, Okla.

504,719. Representations of a rectangle containing a small rectangle and lines. Brake lining sets. Thermoid Co., Trenton, N. J.

504,825. **Multi-Prof.** Plastic films. Elm Coated Fabrics, Co., New York, N. Y.

504,851. Representation of an automobile above which is the word: **"Stormolite."** Waterproof material for auto tops. Atlantic Mercantile Co., New York, N. Y.

504,875. **Steadifeed.** Nursing nipples. H. J. Searer, doing business as Searer Rubber Co., Akron, O.

504,891. Representation of a ball containing the words: **"Gem Weld."** and across which is a streak of lightening. Sporting and recreational articles. Gemlood Corp., Elmhurst, Long Island, N. Y.

504,909. **Scriptite.** Synthetic resins for use as pigment binding agents. Monsanto Chemical Co., St. Louis, Mo.

504,974. **Manhattan MR.** Bowling balls. Raybestos-Manhattan, Inc., Passaic, N. J.

504,986. **Pluracol.** Polyoxyalkylene glycols. Wyandotte Chemicals Corp., Wyandotte, Mich.

505,004. **Sterling.** Carbon black. Godfrey L. Cabot, Inc., Boston, Mass.

505,010. **Renew-Point.** Fountain pens and parts. Esterbrook Pen Co., Camden, N. J.

505,067. **Texcel Tape.** Adhesive tape. Industrial Tape Corp., New Brunswick, N. J.

505,120. **Richmond.** Storage batteries. Laher Spring & Tire Corp., Oakland, Calif.

505,135. **Certi-Flex.** Reenforced tubing. Winkenweder & Ladd, Inc., Chicago, Ill.

505,141. Representation of an arrowhead. Washers, faucet cushions, etc. Arrowhead Rubber Co., Vernon, Calif.

505,179. **Speedy Shoes.** Footwear. Young's Speedy Shoes, Inc., Los Angeles, Calif.

505,192. **Aeroglas.** Synthetic thermosetting resins and plastics. American Cyanamid Co., New York, N. Y.

505,198. **Ambassador.** Tires. United States Rubber Co., New York, N. Y.

505,199. **Yukon.** Footwear. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.

505,200. **Sanslip.** Footwear. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.

505,232. **Texplas.** Thermoplastic and thermosetting molding compounds. Omni Products Corp., New York, N. Y.

505,236. Representation of a small pennant containing the letter: **"C"** between the words: **"Cornell Clipper."** Tires, casings, and tubes. Pep Boys, Manny, Moe & Jack, Philadelphia, Pa.

505,210. **Inner Sanctum.** Belts, suspenders, garters, and hose supporters. Aristocrat Leather Products, Inc., New York, N. Y.

505,264. **V S.** Stabilizers. Baker Castor Oil Co., Bayonne, N. J.

505,296. **Panaflex.** Plasticizers. Pan American Refining Corp., New York, N. Y.

505,310. **Antarox.** Surface activators, wetting agents, and stabilizers. General Aniline & Film Corp., New York, N. Y.

505,314. **Sturdi-Lite.** Crib sheets. L. B. Kleiner Rubber Co., Inc., New York, N. Y.

505,322. **Noturn.** Washers. Scully Rubber Mfg. Co., Baltimore, Md.

505,337. Representation of a rectangle containing the word: **"Bull Dog."** and cut by a circle containing the representation of a bull dog and the words: **"Boston Woven Hose and Rubber Co."** Plastic material sheets. Boston Woven Hose & Rubber Co., Cambridge, Mass.

505,347. **Mother's Aid.** Diaper and laundry bags. Caris Co., Brooklyn, N. Y.

505,349. **Resloomed.** Resin impregnated textile fabrics. Monsanto Chemical Co., St. Louis, Mo.

505,350. **Resloom.** Resin impregnated textile fabrics. Monsanto Chemical Co., St. Louis, Mo.

505,394. **Goodyear.** Wheel rims. Goodyear Tire & Rubber Co., Akron, O.

505,396. **Warren's.** Rug binding, etc. Warren Featherbone Co., Three Oaks, Mich.

505,402. Representation of a circle containing an inner circle of links. Rubberized thread. J. & P. Coats (R. I.) Inc., Pawtucket, R. I.

505,409. Representation of the letter: **"r."** Cement for abrasive forms. Rockwell Mfg. Co., Pittsburgh, Pa.

505,479. **5 Minute.** Tire vulcanizers. Shaler Co., Waupun, Wis.

505,521. **Carroll brand.** Garment, laundry, shopping, and bags. Plymouth Wholesale Dry Goods Corp., New York, N. Y.

505,522. **Carroll House.** Garment, laundry, and shoe bags, etc. Plymouth Wholesale Dry Goods Corp., New York, N. Y.

505,541. **Rain-Tite.** Water repellent work clothes. Black Mfg. Co., Seattle, Wash.

505,559. **Koylon.** Mattresses and cushions. United States Rubber Co., New York, N. Y.

505,564. **Unaristyle.** Tile and floor covering. Pharis Tire & Rubber Co., Newark, O.

505,576. Representation of a triangle containing the letter: **"F"** and the letter: **"F"** inverted. Dater stamps. Fulton Specialty Co., Elizabeth, N. J.

505,627. **Aqua-Seal.** Shower curtains. William W. Loeb Co., Los Angeles, Calif.

505,670. Representation of a rectangle containing the words: **"Dura-Seal."** Pressure-Sensitive adhesive sheets. Bluetex Corp., Perth Amboy, N. J.

505,679. **Roadstyler.** Tires, tubes, plasters and patches therefor, tire covers, tire boots. Pharis Tire & Rubber Co., Newark, O.

505,680. Representation of a circle containing the words: **"Visking Product"** and an inner circle containing a representation of a king's head and the letters: **"VIS."** Plastic sheets. Visking Corp., Chicago, Ill.

505,728. **Olympic.** Tires, tubes, and fan belts. Affiliated Retailers, Inc., New York, N. Y.

505,731. **Inland.** Tires, tubes, patches and packing therefor, camelback, tire sections, tire boots, mechanical rubber goods. Inland Rubber Corp., Chicago, Ill.

505,732. Representation of an oval containing the word: **"Inland."** Tires, tubes, patches and packing therefor, tire sections, camelback tread sheets, tire boots, mechanicals. Inland Rubber Corp., Chicago, Ill.

505,733. **Cool Twist.** Tires. Inland Rubber Corp., Chicago, Ill.

505,779. **Top-Flite.** Golf balls, basketballs, footballs, etc. A. G. Spalding & Bros. Inc., Chicopee, Mass.

505,819. **CBB.** Brake lining sets. Thermoid Co., Trenton, N. J.

505,822. **"64".** Packings. A. W. Chesterton Co., Everett, Mass.

505,881. **2-Plex.** Insulating tape. Manhattan Coil Corp., Atlanta, Ga.

705,887. **Aquablak.** Carbon black. Binney & Smith Co., New York, N. Y.

505,889. Representation of a rectangle containing a roller on which is the word: **"Plasto-Print."** Ink transfer rollers. Bingham Bros. Co., New York, N. Y.

505,890. Representation of a rectangle containing a roller on which is the word: **"Plasto-Roll."** Ink transfer rollers. Bingham Bros. Co., New York, N. Y.

505,918. Representation of a circle containing the word: **"Laher."** Batteries. Laher Spring & Tire Corp., Oakland, Calif.

505,919. **Modicol.** Wetting agents. Nopco Chemical Co., Harrison, N. J.

506,036. **Permex.** Cable. Okonite Co., Passaic, N. J.

506,116. **Carroll House.** Rubber sheeting and pyroxylin sheeting. Plymouth Wholesale Dry Goods Corp., New York, N. Y.

HOW TO *STRETCH* RUBBER PRODUCTION AND *SHRINK* COSTS

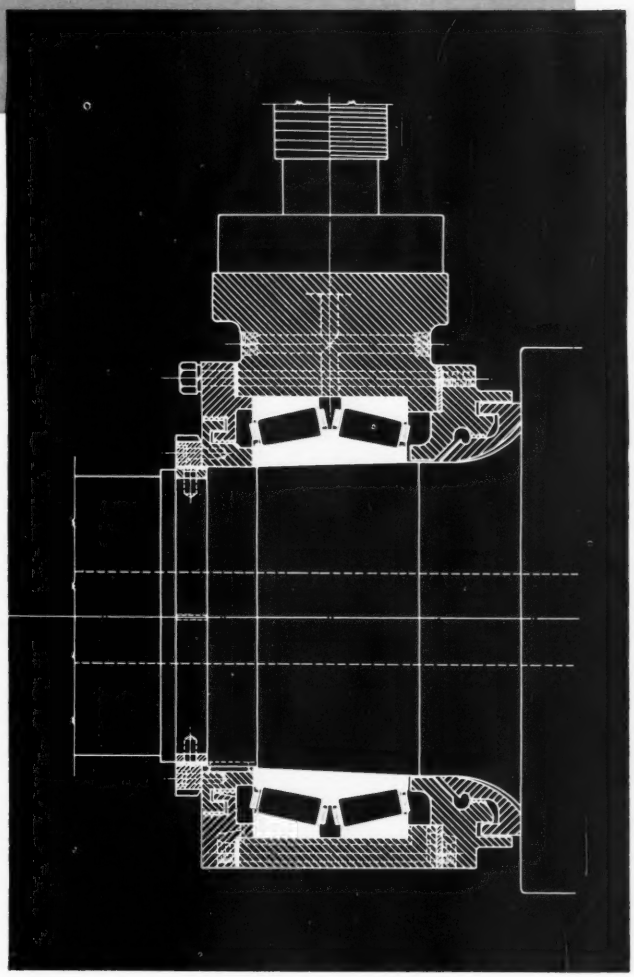
The first thing to do is to put your rubber mills on a maximum power-saving basis. This means eliminating friction, which also will make possible higher operating speeds and reduced lubrication.

The next thing is to give the equipment increased ability to stand up and keep on operating under all conditions, thus reducing out-of-service time. This automatically will cut maintenance attention and cost.

You can get all of these advantages by applying Timken tapered roller bearings to the mill roll necks. This can be done with existing as well as new equipment.

The qualities that enable Timken bearings to accomplish these gratifying results are (1) incredible operating smoothness. (2) ability to carry radial, thrust and combined loads and to hold rotating parts in permanent alignment. (3) Timken alloy steel, the finest material ever developed for tapered roller bearings.

Our engineers are ready at all times to discuss your bearing problems without cost or obligation. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".



Typical Timken bearing mounting for rubber mill roll necks.

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TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION

OTS Bibliography Reports on Rubber Products—XVI

The reports and abstracts thereof given below are taken from the Department of Commerce's monthly publication, "Bibliography of Scientific and Industrial Reports." Reports available in microfilm, enlargement print, or photostatic form may be obtained from the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., with accompanying check or money order payable to the Librarian of Congress. Reports available in printed or mimeographed form may be obtained from the Office of Technical Services, United States Department of Commerce, Washington 25, D. C., with accompanying check or money order payable to the Treasurer of the United States.

Experiments for Improving the Benzene Resistance of Buna. Rohm. PB-L-35682. January, 1944. 2 frames. Microfilm $1; enlargement print $1.50. A brief description is presented of the preparation of the diester of glycol (acryiglycolformate) from glycol monoformate and beta-chloropropionyl chloride. The results are given of tests with a 75% butadiene, 25% diester polymer, both with and without potassium hydroxide treatment of the latex; and with a 90% butadiene, 10% diester polymer without potassium hydroxide treatment of the latex. (In German.)

The Infrared Absorption Spectra of High Polymers, Especially of Butadiene Polymers. PB-L-35689. May, 1941. 28 frames. Microfilm $1.25; enlargement print $3. The spectra of various butadiene polymers, butadiene copolymers, isoprene polymers, and natural rubber were obtained with the aid of the Oppau recording spectrograph. The significance and the evaluation of these spectra permit determination of the content of the middle and lateral double bonds. The great difference between isoprene polymers and natural rubber is also noted by comparison of the spectra. A quantitative method for the determination of the middle and lateral double bonds of butadiene polymers is described. A comparison is made of the values obtained in this way with the values obtained by chemical methods. Numerous graphs are included. (In German.)

Fundamental Problem and Difficulties in the Production of Tires Made Entirely of Synthetic Rubber. Fromandi. PB-L-35734. February, 1943. 7 frames. Microfilm $1; enlargement print $1.50. Experiences and difficulties, particularly in the production of large pneumatic tires and truck tires, are discussed in detail. (In German.)

Preparation of Tire Cord from Artificial Silk. PB-L-35741. June, 1944. 2 frames. Microfilm $1; enlargement print $1.50. The preparation is described, and results of tests on the product are given. (In German.)

Substitution of Nitrile by Styrene Components in Igetex N. Logemann. PB-L-35759. June, 1941. 4 frames. Microfilm $1; enlargement print $1.50. The experiments showed the partial replacement of nitrile by styrene to be feasible and test results to be good except for considerable lowering in rebound. (In German.)

Chlorobutadiene Mixed Rubber. Meisenburg. PB-L-35760. 3 frames. Microfilm $1; enlargement print $1.50. It was investigated whether the insufficient adhesive properties of chlorobutadiene rubber might be improved by copolymerization with nitrile, styrene, vinylmethyl ketone, or vinyl carbazole. The results were negative. (In German.)

Purification and Polymerization of Vinyl Chloride Nitrile. Wolz. PB-L-35763. November, 1943. 8 frames. Microfilm $1; enlargement print $1.50. The technical removal of divinyl acetylene from vinyl chloride nitrile by chlorination is described, and its effect on the polymerization of vinyl chloride nitrile is discussed. (In German.)

Copolymers from Butadiene and Benzalacetone. Rathjen. PB-L-35768. August, 1942. 15 frames. Microfilm $1; enlargement print $1.50. The copolymer of 25% benzalacetone and 75% butadiene was in some properties superior to, otherwise as good as, Buna S. The experiments are described, and graphs and tables appear. (In German.)

Copolymerization of Benzyl-Methacrylate with Butadiene. Muhlhausen. PB-L-35758. August, 1944. 2 frames. Microfilm $1; enlargement print $1.50. The experiments are described. The firmness of the products was disappointing. (In German.)

Copolymerization of Butadiene with Unsaturated Aliphatic Aldehydes. Wolz. PB-L-35770. October, 1943. 3 frames. Microfilm $1; enlargement print $1.50. Experiments on copolymerization of butadiene with acrolein and with croton aldehyde are described. The resulting materials were not yet technically satisfactory, but were considered promising. (In German.)

Comparison of German By-Product Carbon Blacks from the Arc Process for Acetylene with Easy Processing Channel Black in a Natural Rubber Tread Stock. M. C. Throdahl. PB-L-92054. February, 1948. 7 pages. Microfilm $1; photostat $1. Two samples of German by-product carbon blacks from the arc process for acetylene were obtained from the acetylene plant at Huels in the Ruhr and were compared with an American EPC black (Kosmobile 77). Results and experimental data are given and tables are attached.

Reports on Japanese Industries. Section XIX. Rubber and Products. Economic and Scientific Section, Supreme Commander for the Allied Powers. PB-91811. December, 1945. 28 pages. Mimeograph $2; photostat $3.75. This report includes tables.

Rubber Reinforcing Carbon Blacks from Naphthalene and Anthracene (CK3 and CK4 Blacks). Fred S. Thornhill. PB-88805. March, 1948. 41 pages. Mimeograph $1.25. Supplement 1 (PB-88805s), 22 pages, includes diagrams and tables. Mimeograph $2; photostat $3.75. Supplement 2 (PB-88805s2), 42 pages, includes additional drawings. Mimeograph $2.50; photostat $6.25.

Oppanol in Reclaimed Buna S. Schmidt. PB-L-35645. September, 1942. 2 frames. Microfilm $1; enlargement print $1.50. The report describes the effects upon the properties and processing of reclaimed Buna S when Oppanol B-100 and B-200 were added. These were added in 2%, 5%, 10%, and 20% quantities to Buna S tread quality scrap. (In German.)

The Hardening of Reclaimed Buna S upon Storing. Schmidt. PB-L-35647. February, 1943. 13 frames. Microfilm $1; enlargement print $1.50. An investigation was made of the hardening of reclaimed Buna S tread quality rubber which had been stored for periods up to 12 months. The reclaiming agents used were Renacit II and Renacit III (9-thioanthracene) in 1%, 2% and 3% quantities. The plasticizing mixture used consisted of equal parts of mineral oil, Naftolen ZD, and Fatty Tar Oil ESS, and were used in 5% and 15% quantities. The results are shown in tables and graphs. (In German.)

Studies on the Softening of Buna S. Rathjen. PB-L-35653. February, 1941. 30 frames. Microfilm $1.25; enlargement print $3. The Following were tested for their effect on thermal softening: double bond; acid group; iron; manganese; organic oxidizing agents; and stabilizers. The samples of Buna S being tested were preheated to a temperature of 120° and softened at temperatures up to 135°. Numerous tables and graphs are included. (In German.)

Experiments on Improving the Structure of Buna. Rehm. PB-L-35654. June, 1941. 4 frames. Microfilm $1, enlargement print $1.50. It was previously noted that colloidal silicic acid (22-38%) increased the structural strength of Buna. Tests were therefore made to determine the effects produced by precipitation of silicic acid by means of hydrochloric acid ammonium sulfate, aluminum sulfate, and zinc sulfate. The effect of carbon black on the structure was also noted. An investigation was also undertaken to determine whether the effects produced by colloidal silicic acid were specific, or whether other colloids could produce the same results. (In German.)

Reclaiming of Fabric-Containing Buna Scrap in One Operation. Schmidt. PB-L-35642. July, 1944. 13 frames. Microfilm $1; enlargement print $1.50. Experiments were conducted to replace the reclaiming process whereby sodium hydroxide was used to decompose the fabric in rubber tires. The processes described eliminate the necessity of destroying the fabric by using finely divided ground scrap. Tables give the results of reclaiming with a large number of chemicals and give the physical properties of the reclaimed rubbers. (In German.)

Study of Fractional Creaming by Means of Ultra-Centrifuge and Electron Microscope. Wolz. PB-L-35663. October, 1942. 6 frames. Microfilm $1; enlargement print $1.50. Investigation of the latex by means of the ultra-centrifuge and electron microscope demonstrated the distribution of a latex into large and small particles in fractional creaming. (In German.)

Research on "Butadienyl" Rubber. Rathjen. PB-L-35665. September, 1942. 7 frames. Microfilm $1; enlargement print $1.50. It can be demonstrated that the copolymers of butadiene and butadienyl acetate with Diproxid produce a useful rubber which approches Buna S in quality. The hydrolysis of the butadienyl acetate rubber by alkali, both in latex and in the precipitated state, is not possible. The preparation of a hydroxy-butadiene polymer by this means is not possible. (In German.)

Elasticity and Chemical Constitution of Substances with Rubber Elasticity. Stocklin. PB-L-35678. July, 1943. 15 frames. Microfilm $1; enlargement print $1.50. This report discusses the problem of elasticity and chemical constitution in a general manner. The effect of chain length and the effect of plasticizer on the elastic behavior of the rubber-like substances are given special consideration. It was concluded that although much of the knowledge concerning rubber-elastic substances was incomplete, the research did provide a useful working hypothesis. (In German.)

Results of Comparative Osmotic and Viscosimetric Measurements of Buna. Garten. PB-L-35679. July, 1943. 15 frames. Microfilm $1; enlargement print $1.50. The report discusses research concerning the significance of the structure of Buna polymers so far as can be explained by a comparison of their osmotic and viscosimetric behavior. Contents are presented under the following sections: (1) the concept of the degree of branching as a working hypothesis; (2) the basic difficulties in determining osmotic molecular weights; (3) the magnitude of the viscosimetric average degree of polymerization as a measure of the molecular length; and (4) the possibility of interpreting the measured values. (In German.)

(To be continued)

Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Pharmacie Ouvertus, 219 Rue Theodore Verhaegen, Brussels, Belgium: sanitary articles including adhesive plaster, rubber articles, and syringes.

Import Opportunities

Dodwell & Co., Ltd., 24 St. Mary Axe, London, E.C.3, England: Sorbo sponge rubber products.

Harold H. Poster, representing Grosvenor Novelty Corp., 47 Upper Grosvenor St., London, W.1, England: rubber novelty dolls.

London Rubber Co., N. Circular Rd., Chingford, London, E.4, England: rubber fountain pen sacs, golf ball sacs, toy balloons.

Industria de Artefatos de Borracha Borbonite Ltda., Rua Cristovão Colombo 900, Porto Alegre, Rio Grande do Sul, Brazil: pure Brazilian rubber ice bags and hot water bottles.

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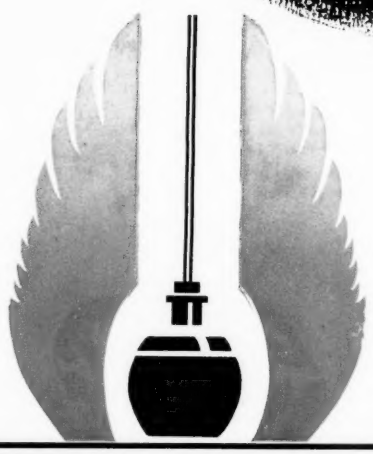

Since 1925 The C. P. Hall Co. has supplied the rubber industry with PARA-FLUX.® Many substitutes have appeared on the market since that time, but PARA-FLUX® continues to be the standard softener and plasticizer for the rubber industry.

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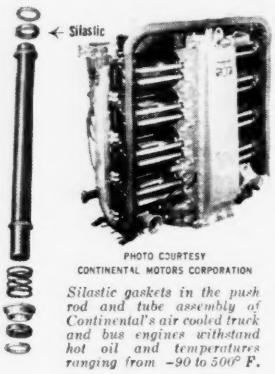
DC SILICONES

Silicone News

Increased Volume Cuts Cost of Silastic*

Design engineers weigh the properties and service life of a material against its price per pound. Sometimes there is only one material that will serve the purpose and price becomes relatively unimportant. That has been true of Silastic, the Dow Corning Silicone Rubber. But this initial market for Silastic has now become large enough to permit more efficient production and the opening of new markets through a price reduction of 20 to 45 cents a pound.

Silastic tubing reinforced with glass cloth is used to seal heating and ventilating ducts operating at 350-400° F. in Consolidated's Vultee Convair-Liner; in jet type planes at temperatures of 350-450° F. and under pressures up to 150 p.s.i.



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CONTINENTAL MOTORS CORPORATION

Silastic gaskets in the push rod and tube assembly of Continental's air cooled truck and bus engines withstand hot oil and temperatures ranging from −90 to 500° F.

In the aircraft industry Silastic found a good initial market because it is the only resilient material that withstands hot oil and both high and low temperatures. Typical uses are: sealing thermal anti-icing systems; gasketing engine rocker boxes; and flexible heating ducts.

In the automotive industry gaskets are only one of the many applications for Silastic now under test.

Only Silastic is serviceable at temperatures in the range of −70° to −150° F. and upward of 500° F. It also has exceptional resistance to weathering and to many chemicals, excellent dielectric properties and water repellency. For more information phone our nearest branch office or write for pamphlet No. F5-U-2.

*TRADEMARK REG. U.S. PAT. OFF.

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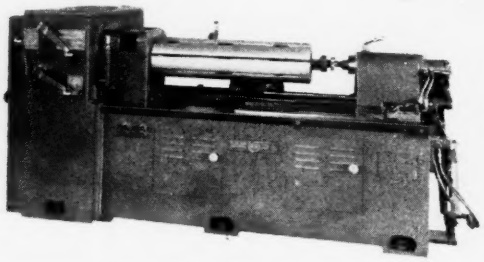
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

Dow Corning
FIRST IN SILICONES

New Machines and Appliances

Plastic Preheater

A NEW Thermall Model 67 high-frequency electric preheater, intended for large plastics molding jobs, has been announced by W. T. LaRose & Associates, Inc., Troy, N. Y. The unit is entirely new in electronic design and is said to achieve operating performance, efficiency, and economy heretofore unknown. Compact in size and completely portable, the unit requires only 27 by 34 inches of floor space and stands 56 inches high. The preheater is rated at 10 k.w. output, or six to seven pounds of compound a minute.



Black Rock 4A-20 Washer Cutter

Automatic Cutter for Washers

A NEW machine that will cut large-size washers automatically has been announced by Black Rock Mfg. Co., Bridgeport, Conn. The Black Rock 4A-20 washer cutter will handle stock ranging in size from 10 to 20 inches outside diameter, having a wall thickness of 1¾ inches, and will cut widths from 1/32- to one-inch in width. Four sizes of especially designed expanding mandrels handle the full range of diameters. When in use, the mandrel remains in the machine at all times.

PHILBLACK O PHILBLACK A PHILBLACK O PHILBLACK A PHILBLACK O

Philadelphy ?
SEE PAGE 676

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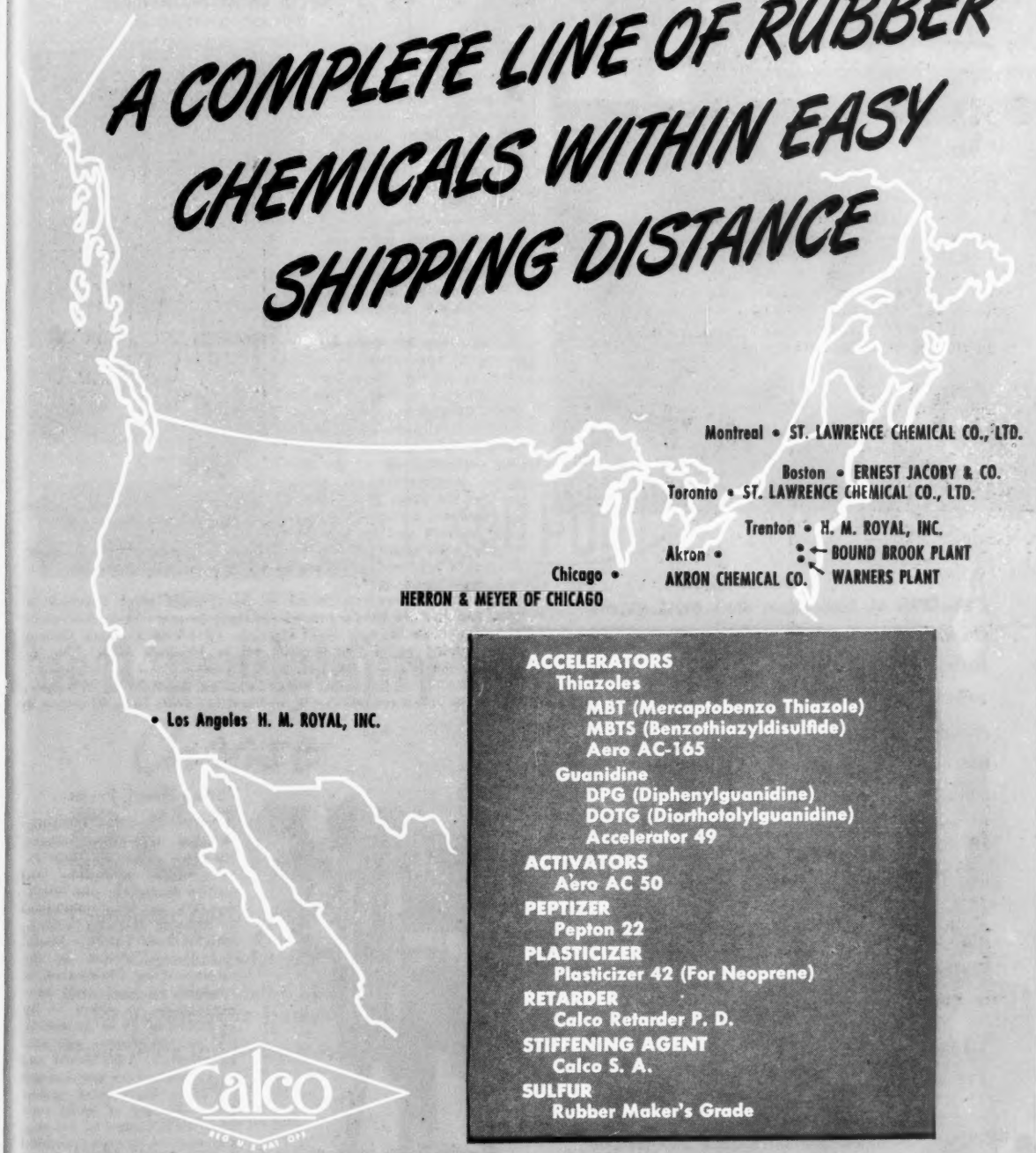
A COMPLETE LINE OF RUBBER CHEMICALS WITHIN EASY SHIPPING DISTANCE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Chicago •
HERRON & MEYER OF CHICAGO
• Los Angeles H. M. ROYAL, INC.

ACCELERATORS
- Thiazoles
  - MBT (Mercaptobenzo Thiazole)
  - MBTS (Benzothiazyldisulfide)
  - Aero AC-165
- Guanidine
  - DPG (Diphenylguanidine)
  - DOTG (Diorthotolylguanidine)
  - Accelerator 49

ACTIVATORS
- Aero AC 50

PEPTIZER
- Pepton 22

PLASTICIZER
- Plasticizer 42 (For Neoprene)

RETARDER
- Calco Retarder P. D.

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- Calco S. A.

SULFUR
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As ONE of the oldest and most experienced formulators of special coatings in the Rubber Industry, STANLEY is continually called upon by leading manufacturers to supply them with tough, reliable, and long-lived coatings — no matter how unusual or complex their specifications.

In addition to its rapidly expanding line of rubber coatings, STANLEY offers *VINYL INKS* for rotogravure and silk screen printing . . . *ORGANOSOLS* for fabric or paper coatings . . . *PLASTISOLS* for moulding or coating.

If you have a product, regardless of its material, requiring a finish with special characteristics, ask us about it. STANLEY CHEMICAL COMPANY, EAST BERLIN, CONNECTICUT.

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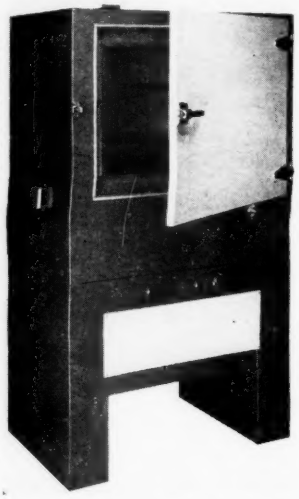
INDUSTRIAL COATINGS

LACQUERS SYNTHETICS JAPANS ENAMELS

The expanding and collapsing of the mandrel is accomplished by motor drive through the gear box. All control levers are easily accessible to the operator. Loading and unloading are facilitated by the disappearing-type tailstock which swings over the back of the bed and is air actuated.

Laboratory Oven



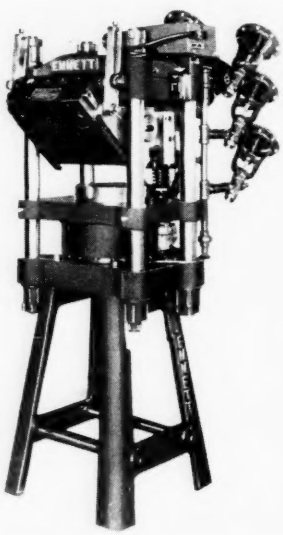
Modern Electric's Forced Convection Electric Utility Oven

NEW, modern, and completely functional forced convection electric utility ovens are now being produced by Modern Electric Laboratory, Chicago, Ill. The ovens are made in both floor and bench models and in six standard sizes. Two series of ovens are available: one series of six has a maximum temperature of 350° F., and the other series, in the same sizes, has a maximum temperature of 550° F.

The ovens are designed for improved appearance in addition to service performance. Of integral welded construction throughout, the ovens have specially designed multi-bladed turbo-blowers circulating preheated air at the desired temperature to every part of the oven. The blowers are powered by special heavy-duty motors and in conjunction with air vents produce 50 air changes a minute. Precise heat control is achieved by means of a hydraulic snap action thermostat sensitive to 0.5° C.

The ovens are constructed of heavy-gage steel finished in blue hammerloid baked enamel resistant to marring and scratching. The oven interior is of stainless steel and has two shelves of expanded metal that can be set in 1¼-inch steps. The insulation consists of three-inch thick Thermo-Flake bonded blocks. Floor models of the ovens range in height from 56 to 70 inches; while the bench models can be had ranging from 30 to 49 inches in height.

Tilting-Head Press



Merit Model E-113 Tilting Head Hydraulic Press

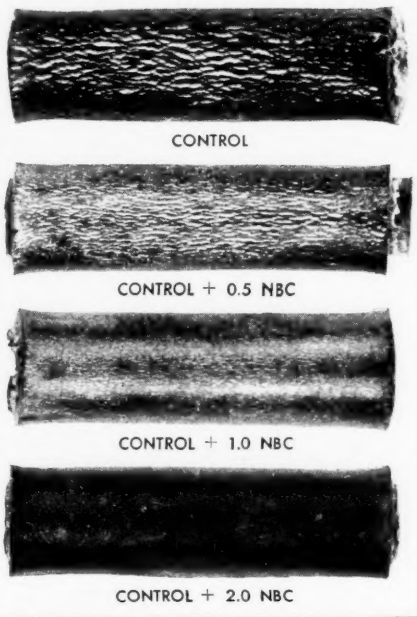
A NEW Merit line of tilting-head hydraulic presses, featuring positive safety devices, rapid operation, and quality materials and workmanship, has been announced by Emmett Machine & Mfg., Inc., Akron 14, O. Model No. E-113, shown in the accompanying illustration, is available in two sizes, having platens of either 14 by 14 inches or 24 by 24 inches, and heated platens can also be supplied. This model has been designed for applications requiring high-speed operation, accuracy of mold register, convenience of loading, and ease of stripping molded products from the press. Construction features include bronze bushing guides on lower platen; annealed steel ram, cylinder, and head castings; and completely self-contained packing cartridge which can be removed quickly and easily for replacement or maintenance.

The Model E-113 press has an operating speed of three seconds, including opening or closing of mold and tilting of head.

(Continued on page 794)

NEW COMPOUNDING MATERIAL FROM DU PONT

CONDITION OF GR-S SIDEWALL STOCKS AFTER 56 DAYS' OUTDOOR FLEXING IN FLORIDA



CONTROL

CONTROL + 0.5 NBC

CONTROL + 1.0 NBC

CONTROL + 2.0 NBC

NBC

- ✓ Inhibits dynamic and static exposure cracking of GR-S
- ✓ Improves heat resistance of neoprene
- ✓ Retards sunlight discoloration of neoprene

Now, with Du Pont NBC, GR-S compounds can be fortified against both static and dynamic exposure cracking. The illustration proves its effectiveness in a typical GR-S tread and sidewall stock. Even after 56 days of outdoor flexing, the stock with 2.0 parts of NBC showed no cracking. The control stock began to crack after only two days' flexing.

In neoprene stocks, which do not require protection against exposure cracking, NBC is important for other reasons: It is useful for improving heat resistance. And it effectively retards sunlight discoloration in colored compounds.

Compounders will find NBC an important ingredient for broadening the usefulness of both GR-S and neoprene stocks. Complete information on its use will be found in Report 49-1.

Extra copies are available. Experimental samples on request. See your Du Pont representative or write:

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Plastic Wire Insulation Machines

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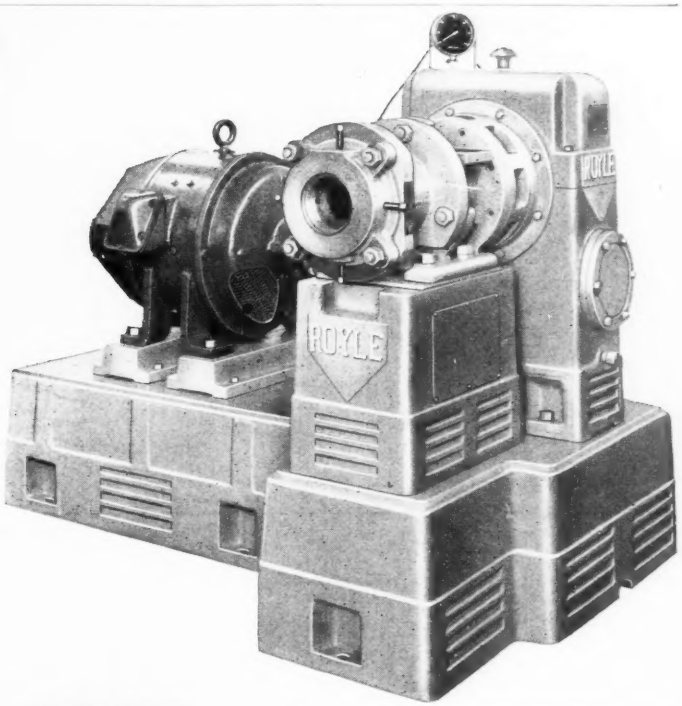
•

Temperature Control Units



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PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

London, England — James Day (Machinery) Ltd — REgent 2430
Home Office — E. B. Trout, J. W. VanRiper — SMerwood 2-8262
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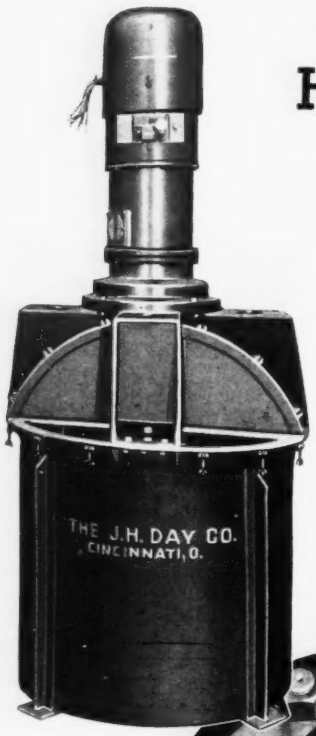
Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

ROYLE No. 2 Extruding Machine. Non-extended cylinder, plain tubing head, direct coupled drive. This extruding machine is designed for conventional applications in the rubber field.

DAY Rubber Cement Mixer

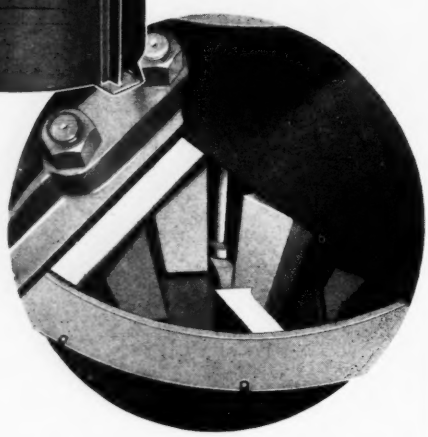
Hero Type



USED EXTENSIVELY IN RUBBER PLANTS THROUGHOUT THE COUNTRY

BELOW

INTERIOR VIEW SHOWING HEAVY AGITATOR BLADES



The DAY Hero Rubber Cement Mixer requires much less time for dissolving a batch than does the older type of mixer. Four sets of stationary blades, spaced at 90 degrees, extend downward from the top frame. Two sets of blades, spaced at 180 degrees, extending upward from heavy agitator arms located at the bottom of vertical shaft, rotate with the shaft.

The lower picture shows the blade section of the DAY Rubber Cement Mixer, illustrating the close clearance between the stationary and the moving blades, which shear the rubber into smaller and smaller pieces, constantly exposing more surface to the action of the solvent.

THE J. H. DAY COMPANY

.CINCINNATI 22 OHIO

EUROPE

FRANCE

Active Zinc Oxide B.G. 150

Actually B.G. 150, the active zinc oxide developed by Lucien Graffe in collaboration with Paul Bary, is not quite new. It was introduced for the first time at the Anglo-French Rubber Congress, Paris, May 16-18, 1940. However it was at the time only a laboratory product, the development of which was first stopped by the war and then hampered by the postwar economic difficulties.

B.G. 150 is a derivative of B.G. 125, first marketed in 1935. The latter is a hydrated carbonate of zinc prepared by precipitation of a soluble salt (sulfate or chloride), by the carbonate or bicarbonate of soda and has properties similar to those of known active zinc oxides.

B.G. 125, prepared from zinc sulfate, has the advantage over ordinary zinc oxide of being entirely free of lead and consequently of giving pure white mixes without the need of additional large doses of white pigment. B.G. 150 is the calcined product of B.G. 125. But it contains a slight proportion of carbonic anhydride resulting from the incomplete decomposition of the carbonate and traces of water due to absorption of moisture from the air.

B.G. 150, furthermore, is much finer than ordinary zinc oxide and is claimed to have three times the activity of B.G. 125, a circumstance which makes it particularly useful for the manufacture of articles coming into contact with food products where zinc must be excluded, because the proportion of zinc present is practically negligible.

B.G. 150 in large doses seems to permit the use of decreasing amounts of accelerator; in fact a compound containing 50% B.G. 150 and 3% of sulfur was vulcanized at 140° C. in 45 minutes without the inclusion of an accelerator. On the other hand the substance may be used to cure mixes in the absence of ordinary sulfur; thus vulcanizates have been obtained in 10 minutes at 154° C., with 1.75 Tetrone A, 0.1-1% tetrasulfide of pentamethylene thiuram, and 0.1-1% of B.G. 150. Excellent transparent goods can be made in this way, it seems.

The new zinc oxide can be incorporated in GR-S with the same ease as in natural rubber; here too it has an activating effect permitting quick cures at 135-140° C., but it shows little reinforcing effect.

In abrasion tests it was found that losses were very slight with low B.G. 150 content; comparison of a tread stock containing 20 volume parts of carbon black with a compound containing 19.4 volume parts of B.G. 150 showed a slightly higher abrasion coefficient for the former.

In collaboration with P. Bary, M. Graffe tested other zinc salts as the formiate, oxalate, stearate, and laureate of zinc. The first proved devoid of interest; the second proved to be not an activator, but retarder of vulcanization, suggesting possible use as a corrective in over-activated mixes or those subject to scorching. The salts of the saturated fatty acids form excellent dispersions, but have the disadvantage of having too great a plasticizing effect so that they can only be used in small amounts; the stearate also activates vulcanization.

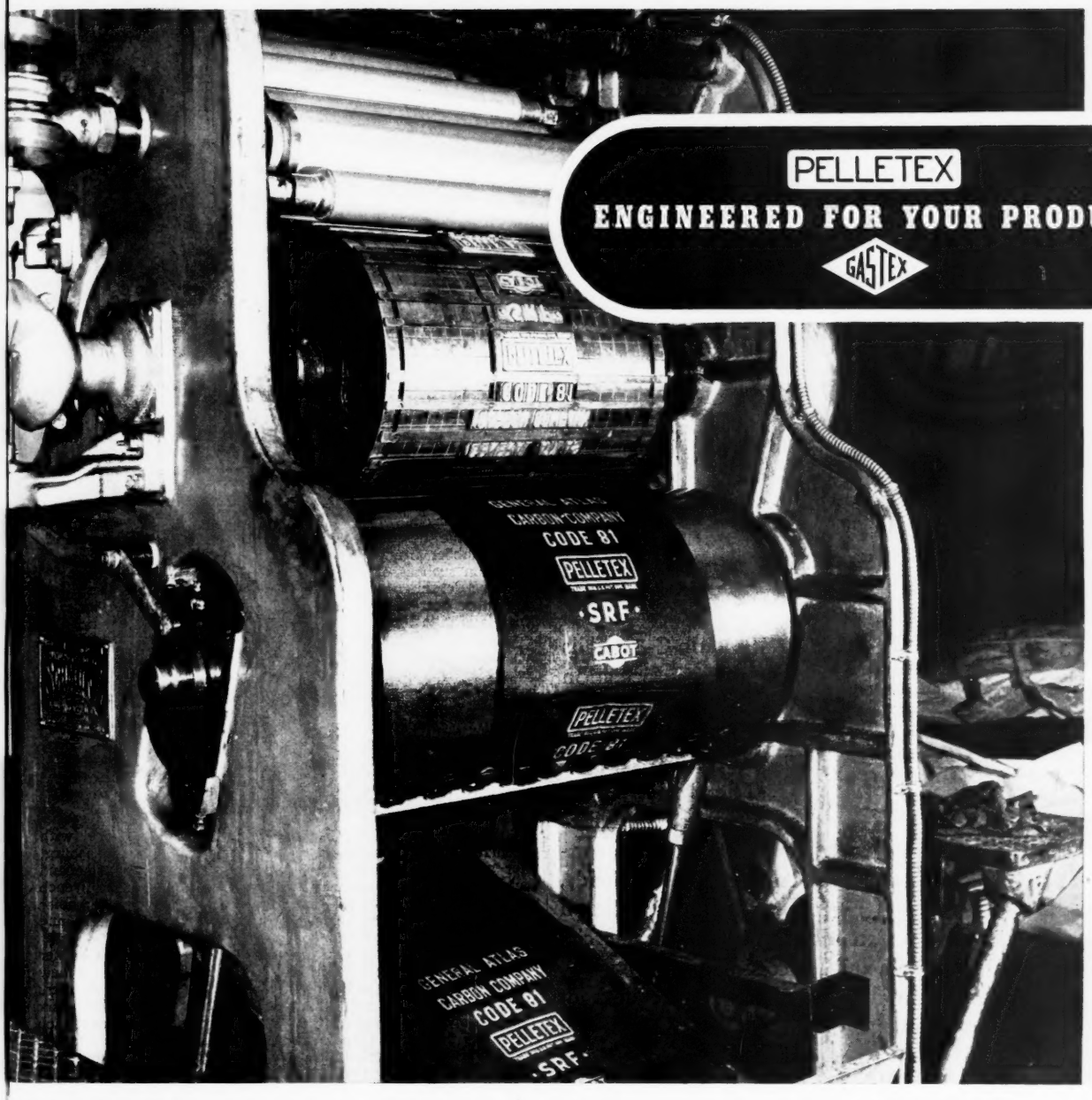
The author concludes by pointing out that the field of application of these products is vast, and the field for investigations, as far as they are concerned, far from exhausted.

Rubber at the Automobile Show

The Thirty-Fifth Automobile Show, the third since the liberation, was opened October 7, 1948, in the Grand Palais, Paris, as usual. From the very outset the visitor was impressed by the number of moderately priced French cars of sturdy construction and low gasoline consumption, bearing witness to the fact that the interests of the average French consumer could once again be considered.

In Panhard's 3 CV much use of rubber is made; the Simca Six has its motor mounted on blocks of rubber. The motor of the Ford Vedette is mounted at front and rear on resilient blocks of metal and rubber of a new design; while the body of this car rests on wedges of rubber.

Tire and rubber manufacturers were well represented; all the best-known firms were accounted for. Michelin had an amusing stand to demonstrate the uses of its various types of tires; it also showed the new "Airstop" inner tube made of Butyl rubber.



PELLETEX—*Carbon black produced to customer specifications shipped in bags printed to customer specifications*

Printing presses installed at the General Atlas plants mean faster, more accurate service to the rubber manufacturer. Each bag of Pelletex is clearly identified with brand name, grade, weight and individual code numbers. Pelletex bags are clean and legible when they leave the plant — clean and legible when they arrive at your factory.

BOT **The GENERAL ATLAS Carbon Co.**

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The B. E. Dougherty Company, Los Angeles and San Francisco • Delacour-Gorrie Limited, Toronto

. . . for the rubber compounder

Technical Bulletin C-3

*DAREX COPOLYMER X43

Now
LIGHT IN COLOR
for perfect blending
FINELY GRANULATED
for easy processing . . . no need for masterbatching
CONVENIENTLY PACKAGED
for ease in handling and storage . . . disposable bags

Bulletin C-3 details complete information on this new, low-cost, high styrene Copolymer, DAREX X43.

The Bulletin lists properties, describes its effect in compounds of natural rubber, GR-S, blends, GR-S hard rubber and electrical insulation and gives extended notes on commercial applications and processing.

Bulletin C-3 should be on the desk of every maker of

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DEWEY AND ALMY CHEMICAL COMPANY
CAMBRIDGE 40, MASSACHUSETTS

Kleber-Colombes (Goodrich) presented a complete range of tires for all purposes as well as a variety of other rubber automobile accessories and parts. A feature of this company was a new tubeless, puncture-proof tire which has a lining of Butyl, special construction to insure tight fit about the rim edge, double-jointed rubber valve adaptable for all rims, and an internal protective mix which adheres to any penetrating object and reseals itself when the object is removed.

Dangers Confronting Plantations

The *Hevea* plantations of the Far East face the double threat of technology and ideology, M. P. Petithuguenin, member of the board of directors of the Institut Français du Caoutchouc, emphasized in the course of a talk before the members of a political economy group.[1] Synthetic rubber, of course, constitutes the technological menace. Today it is still inferior to natural rubber for 80% or even 90% of rubber manufactures. But competition is forcing the producers of both natural and synthetic rubber to constant effort to improve their respective products so that they may eventually be of equal value, and then their fate will be determined by cost of production. As far as synthetic rubber is concerned, however, the cost price is falsified by the arbitrary measures of the American Government, the speaker said.

The ideological factors are first American anti-colonialism, which discredits the work of colonizing countries and fails to understand the part it plays in maintaining that very balance of world economy at which the plans of the UN aim. The second factor is the hostile attitude of American liberalism, adopted by the Rubber Study Group, toward any kind of regulation of production such as existed up to 1940. Regulation of this kind, said Mr. Petithuguenin, is necessary to prevent crises resulting from either over- or under-production and to safeguard a heritage which is of great importance for world economy, and he concludes by expressing the hope that Americans will take under consideration the contradictions in their positions on certain economic and social questions and with their usual practical sense will succeed in resolving them.

[1] *Rev. gén. caoutchouc*, Jan., 1949, p. 3

New Rubber-Tired Train

On November 4, 1948, the first postwar train equipped with pneumatic tires began the express run from Paris to Strasbourg, after a preliminary trip from Paris to Chalons-sur-Marne and back. The new train is one of three recently built for the French railways to new standards of speed, comfort, and safety; noise and vibration have been largely reduced, and acceleration and braking markedly improved.

The use of pneumatic tires both demands and permits a lighter construction and to provide a basis of comparison the three new rubber-tired trains have been built of different materials, stainless steel, ordinary steel, and a light alloy. Each train includes six Pullman-style coaches which weigh only about 16 tons each instead of the usual 30 to 35 tons, and each coach is mounted on two bogies of five axles fitted with Michelin tires inflated to a pressure of nine kilograms per square centimeter (130 p.s.i.). The coaches are said to be the last word in traveling luxury; they are equipped with neon lights, air-conditioning, foam-rubber-upholstered seats.

Other Notes on the French Rubber Industry

The newly appointed board of directors serving both the I.F.C. and the I.R.C.I. (Indo-China Rubber Research Institute), includes the following: Ch. Dufraisse, honorary president; the governor general Le Gallen; Ph. Langlois-Berthelot, president; R. M. E. Michaux, vice president; M. Monguillot, representing the High Commissioner of the Republic of Indo-China; Messrs. de Lauzieres, de Vogue, and Petithuguenin, delegates of the Rubber Planters Association; Messrs. Guillemet, Guyot, Daroussin, delegates of the Association of Rubber Planters in Indo-China. J. Le Bras has been appointed scientific inspector general of the I.F.C. and the I.R.C.I. M. R. de Padirac has been named director general of the I.F.C.; and M. Mignen, delegate in Indo-China of the president of the board of directors, has been made inspector of the I.R.C.I.

At the first meeting of the year 1948-1949 of the French Association of Rubber Technologists, held September 30, 1948, about 40 members heard M. Delattre, of the Société Francolor, discuss his "Study of Thermosensitivization of Latex by Bio-

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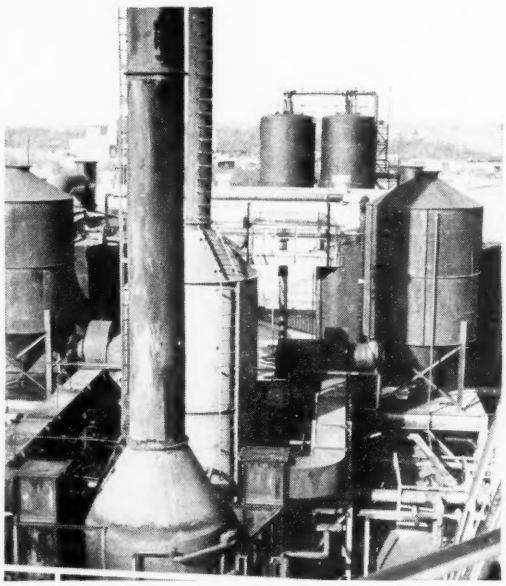

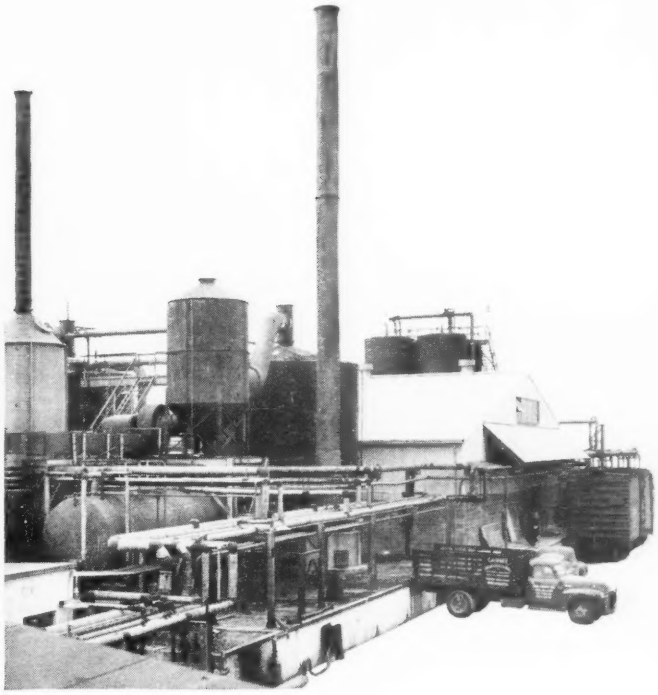

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chemical Degradation by Means of Desomulon X." These investigations were made to determine the possibility of using an industrial ferment (Desomulon X) and disclosed some very interesting aspects of the biochemical decomposition of latex, notably the effect of ripening in the presence of zinc oxide, antiferments, etc. At the same meeting M. Gerard, head of the Research Laboratories of Société Geoffroy-Delore, spoke on "Rubber and the Synthetic Elastomers in Electric Cables."

A new experiment in paving with bitumen-latex emulsion, in which the Bureau of Roads and Bridges of the Calvados Department and the Societe "La Route" collaborated, was started last September at the intersection on the road from Caen to Courseulles. The part of the intersection pointing toward Caen was paved with a mixture including a 50% bitumen emulsion in a solution of resinate of soda, and 5% of latex having a dry rubber content of 38%. The part pointing toward Courseulles was paved on the same day, hence under the same conditions, with a 50% bitumen emulsion without latex so as to provide a control against which the behavior of the rubber-containing emulsion can eventually be checked.

On the following day a similar experimental section was laid at the crossing of Beny-sur-Mer.

Societe Heito of Paris has put on the French market a new pH-meter said to be very easy to manipulate and carefully and solidly constructed. The device employs the latest improvements of electronics and makes use of the possibilities offered by American tubes. It permits rapid measurement of the pH of a solution by reading a galvanometer graduated from 0 to 14 pH units.

France imported 75,755 tons of rubber in 1947, including 39,542 tons from Indo-China, 22,520 tons from Malaya, and 5,496 tons from the United States. In the first 10 months of 1948, rubber imports reached 75,726 tons, against 63,687 tons for the same period of 1947. The 1948 figures reveal decreases in shipments from Indo-China and the United States, among others, but a pronounced increase in shipments from Malaya, which, at 39,977 tons, were not only almost double the shipments from this source during the entire year of 1947, but also topped the Indo-China figure for that year.

GREAT BRITAIN

Rubber Goods Exports

In accordance with the revised export targets, the rubber industry should increase the volume of its exports to 220% of that of 1938 by the end of 1949; this, it is pointed out, means that manufacturers must export rubber goods (excluding tires and electrical goods) to a value of £700,000 a month.

Figures published by the Board of Trade for Britain's average monthly exports of rubber goods during 1947 and the first 10 months of 1948, as compared with those of 1938 indicate that though exports of most items have increased steadily, the goal aimed at is on the whole still far off. This condition is largely due to the severe import restrictions in force in many consumer countries, the braking effect of which is chiefly reflected in the failure of the 1948 monthly average exports of those goods grouped in Board of Trade returns under the heading "Rubber Manufactures" to rise substantially above the 1947 level. The average monthly value of exports of this category in 1938 came to £137,461; in 1947 it had risen to £525,815, but in the first half of 1948 it advanced only to £550,615 and fell back again to £528,234 in the succeeding four months.

The foreign trade in tires and electrical goods developed in a more satisfactory manner; 1948 exports rose steadily above the 1947 monthly averages.

An examination of the destination of the different classes of manufactures indicates that the countries within the British Empire continue to be England's best customers. Before the war India and Pakistan had ranked first among buyers of British automobile tires, with average monthly purchases of 13,012 units; in 1947 the monthly average fell to 563 and during 1948 continued to dwindle until in July only 159 tires were bought. A recovery followed and in September and October, 1948, the figures had jumped back to 2,392 and 2,948 units, respectively.

Australia is the largest buyer of Britain's "Rubber Manufactures"; in prewar days the Commonwealth was also the best customer for insulated electric wires and cables; though her purchases of telegraph and telephone wires and cables continue to top those of any other country, except possibly the Union of South Africa, her imports of other kinds of rubber-insulated wires and cables in 1947 and 1948 were only a fraction of the prewar amounts, and South Africa now leads as buyer of such goods.

Of non-British customers Denmark still ranks first, as in 1938. Other good customers for Britain's rubber articles are Sweden, Holland, Norway, Eire, and Argentina.

The following table shows the monthly average exports of some of the most important manufactures:

		1938	1947	First Half, 1948	July-October 1948
Tires:					
Aircraft	*no.*	n.s.s.*	912	1,683	1,200
Motorcycle and tricar	*no.*	3,880	5,646	9,543	13,228
Other motor vehicles	*no.*	102,064	82,121	122,938	121,541
Cycle tires	*no.*	172,274	173,247	341,723	261,684
Tubes:					
Motor cycle and cycle	*no.*	148,227	180,588	319,459	289,209
Other motor vehicles	*no.*	75,182	79,282	103,027	102,628
Rubber Manufactures:					
Rubber thread	*cwt.*	632	1,039	1,408	1,350
Hose and tubing	*cwt.*	2,988	5,029	5,930	5,820
Elastic cord and fabric	*lbs.*	48,695	101,925	128,318	126,750
Hot water bottles	*doz.*	1,664	8,355	8,428	4,958
Hard rubber sheets, tubes and rods	*cwt.*	112	880	1,116	897
Sponge rubber and cellular rubber	*cwt.*	n.s.s.	n.s.s.	1,284	1,695
Soling rubber	*cwt.*	n.s.s.	988	684	229
All other sorts (not elsewhere specified)		£85,623	£148,064	£99,663	£110,742
Machinery belting (including conveyer and elevator bands)	*tons*	293	384	371	418
Telegraph and Telephone Insulated Wires and Cables:					
Submarine		£17,289	£40,397	£42,119	£22,583
Others		£71,803	£255,313	£563,155	£659,086
Other rubber-insulated wires and cables		£117,533	£424,196	£413,011	£450,300
Footwear	*doz. prs.*	5,375	9,897	18,793	19,875
Golf balls	*doz.*	27,036	28,619	18,148	15,381
Tennis balls	*doz.*	30,568	21,369	13,755	17,562
Rubberproofed garments	*no.*	47,850	40,128	12,341	16,192

n.s.s.—not shown separately.

I.R.I. Elections

At the twenty-seventh annual general meeting of the Institution of the Rubber Industry held in London, December 10, the following officers were elected for the ensuing year: president, F. D. Ascoli; vice presidents, Sir George Beharrell, E. N. Bradley (chairman, Rubber Trade Association of London), S. A. Brazier, Col. J. Sealy Clarke, H. A. Daynes, H. W. Franklin, A. Healey, T. H. Hewlett, P. V. Hunter (chairman, Cable Makers' Association), A. Johnston, Fordyce Jones, L. V. Kenward, Sir Eric Macfadyen, G. Martin, E. Miller, W. J. S. Naunton, S. S. Pickles, H. Rogers, P. Schidrowitz, J. Scott, D. F. L. Zorn; hon. treasurer, F. M. Panzetta; council, 10 ordinary members: C. B. Copeman (director, *India Rubber Journal*), C. M. Blow (British Rubber Producers' Research Association); B. L. Davies (United Ebonite & Lorival, Ltd.), T. L. Garner (John Bull Rubber Co.), Maldwyn Jones (I. C. I. Plastics Division), T. Martin (Anchor Chemical Co.), D. Parkinson and E. F. Powell, (both of Dunlop Rubber, Ltd.), S. D. Sutton (Veedip, Ltd.), V. H. Wentworth (British Insulated Callender's Cables, Ltd., Anchor Works).

A successful meeting in Liverpool, October 18, when a paper, "Staining Problems Associated with Rubber Compounding Ingredients," was read by J. Haworth and W. R. Pryer, of Imperial Chemical Industries, Ltd., led the I.R.I. council to re-form the Liverpool Section. After the lecture a special meeting was held when temporary officers and a committee were appointed.

Philadelphy ?
SEE PAGE 676

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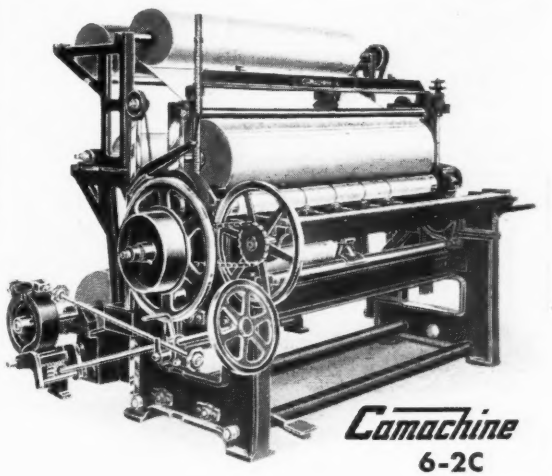

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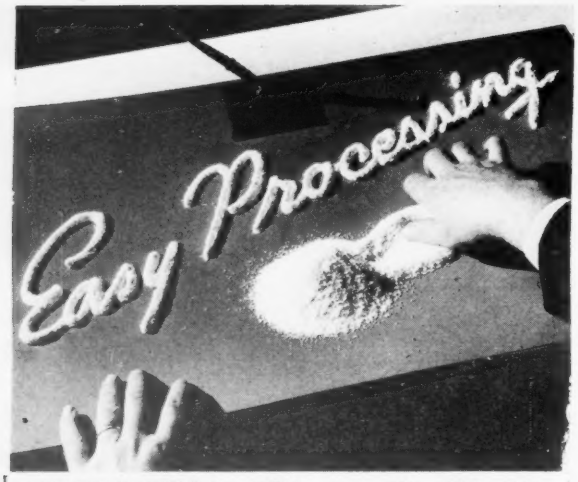

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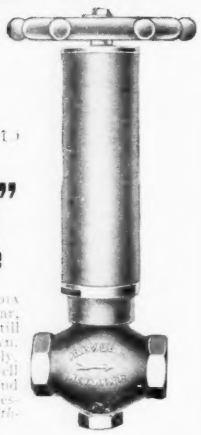

which we have been showing in INDIA RUBBER WORLD for more than a year, but, our engineers have now made it still easier by adding the handwheel as shown. Adjustments can now be made more quickly. Leading rubber factory executives are well acquainted with this remarkable valve and what it will do. With ease, it reduces pressures as high as 6,000 lbs. per sq. in. without shock—air, water, or oil.

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British Rubber Trade Notes

Cost of production would be seriously higher in England than earlier investigations had indicated, L. Cabot, of Godfrey L. Cabot, Inc., Boston, Mass., U.S.A. which is promoting the carbon black factory to be built in Liverpool in cooperation with the European Recovery Program, stated at a recent meeting of Liverpool Section of the Institution of the Rubber Industry. The Liverpool factory, he added, would probably require more labor than would be needed in the United States. But the plan would be pushed ahead if it is at all possible to make an "economic go" of it, Mr. Cabot promised.

Slazengers Ltd., London, has increased its capital by £500,000 in 300,000 4½% cumulative redeemable preference and 200,000 shares of £1 each, beyond the registered capital of £450,000.

P. B. Cow & Co., Ltd., increased its capital of £500,000 by £487,500 in £1 shares.

Pliofilm is being used by the Ministry of Food for packing whale meat and is said to keep it fresh throughout the journey from the Antarctic fishing grounds to England without the need of refrigerator ships.

At a recent conference of directors of cooperative research associations held in London, Herbert Morrison, speaking as the Minister responsible to Parliament for the Department of Scientific and Industrial Research, stated that the government has decided that a larger share of the country's building resources must be made available for the equipment of research and other institutions likely to contribute to raising the productivity of industry. Emphasizing the importance of research in enabling Britain to regain the lead in competitive world industry, he added that in 1938 total expenditure of research associations had been £470,000; in 1947, almost £2,000,000, and was expected to reach £2,500,000 in 1949.

Britain and Poland were reported to be concluding a five-year trade pact for a $600,000,000 exchange of goods. According to this deal—the biggest involving East-West trade since the end of the war—Poland is to export to Britain bacon, eggs, and timber in exchange for machinery, wool, and rubber.

Coagulation of Latex

(Continued from page 722)

Summary

The experimental work described above lends general support to the hypothesis that in the coagulation or gelling by sodium silicofluoride of 60% centrifuged latex at an alkalinity of 0.5% NH_3 the silicic acid formed by the hydrolysis of the silicofluoride is a contributing factor.

With initial ammonia contents of 0.5% each latex appears to exhibit a characteristic pH of gelling by sodium silicofluoride in the presence and absence of zinc oxide. With some samples the gelling pH is not influenced by the presence of zinc oxide, but in others it is raised.

In a sample which gave similar gelling pH's in the absence and presence of zinc oxide the latter figure could be increased by the addition of small amounts of certain soaps to the original latex.

There appears to be no general relation between Z.O.T., KOH, and gelling pH values for the latex samples examined.

Santobrite-preserved latex is very stable to the action of sodium silicofluoride alone; it is, however, comparable in gelling pH with other latices in the presence of zinc oxide when the original alkalinity is raised to 0.5% NH_3. It differs from other latices in being more stable to gelling by sodium silicofluoride in the presence of zinc oxide at very low ammonia contents.

Obviously, much more experimental work is required before the significance of the results obtained in this paper can be fully assessed, and such investigations are now proceeding.

Appreciation is expressed to the Dunlop Rubber Co. for permission to present this paper.

Editor's Book Table

BOOK REVIEWS

"The Chemistry of High Polymers." C. E. H. Bawn. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 5½ by 8½ inches, 258 pages. Price $4.50.

This volume is based on a series of postgraduate lectures given at the University of Bristol, England, in 1946. Intended primarily for beginners in the field, the text covers the basic principles of the formation and structure of high polymers. Although requiring a background in chemistry, the presentation is quite clear, and much use is made of graphical and pictorial representations. Specific details of the methods used in polymer preparation are not given, and references to the literature are quite general in nature.

The subject matter is presented systematically, beginning with a chapter on the nature and types of polymer. Two chapters cover condensation and addition polymerization, with emphasis on kinetics of polymer formation and molecular weight distribution. The chapter on thermodynamics of high polymer solutions emphasizes the application of thermodynamics to specific problems. Chapters on size and shape of macromolecules and the structure, steriochemistry, and crystallinity of high polymers follow, and the volume concludes with a chapter on the structure and physical properties of high polymers. A comprehensive index is appended.

"Practical Color Simplified." William J. Miskella. Published by The Miskella Infra-Red Co., E. 73rd & Grand Ave., Cleveland 4, O. Cloth, 5½ by 8½ inches, 126 pages. Price $5.

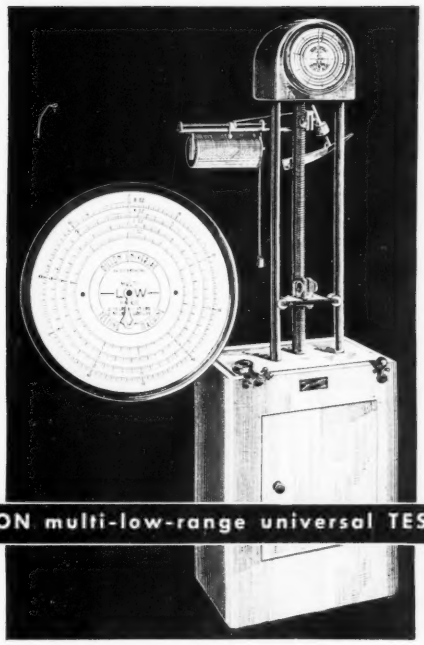
This practical handbook gives clear and simple instructions on handling color. After an introductory chapter on color principles and terminology, there are individual chapters on color choosing, color mixing, color harmony, color matching, colored lighting, color photography, color language, color designation, color pigments, color testing, color and business, and fluorescent lamps. Although written primarily for the paint and protective coating industry, the book contains much information of more general interest. Many tables and color plates are used to illustrate the text, and a valuable color chart is appended which permits mechanical color selection, mixing of shades and tints, and color harmonization. An adequate subject index is included.

"Technical Data on Plastics." Plastic Materials Manufacturers Association, Inc., Tower Bldg., 14th & K Sts., N. W., Washington 5, D. C. Cloth, 8½ by 11 inches, 146 pages. Price $2.50.

This third edition of the well-known compilation presents a wealth of technical data on plastics. Following prefaces on the Association and its activities and an introductory section, individual sections cover 23 types of plastic material. Each section consists of a description of the material and its general properties and applications, followed by information on color, transparency, surface characteristics, and chemical resistance, and concludes with tables and charts giving available quantitative data on the material. The trade names and suppliers of the various plastics are also given. The book is an invaluable source of data on all types of plastic materials and indispensable to all technical workers in this field.

NEW PUBLICATIONS

"Bibliography of Rubber Literature for 1942 and 1943." Division of Rubber Chemistry, American Chemical Society. Treasurer: C. W. Christensen, 1512 Second National Bldg., Akron 8, O. Cloth, 6 by 9 inches, 352 pages. This sixth edition of the Bibliography follows the format of preceding editions. A revision in the method of compilation has resulted in more comprehensive coverage of the literature; the present edition has 50 more pages than the preceding issue and contains about 3,850 references instead of about 3,350. The inclusion of one-sentence abstracts where references titles are not self-explanatory and the incorporation of other changes in references add to the recognized value of this series.



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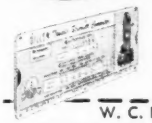

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Bulletins of Phillips Petroleum Co., Akron, O. **"Carbon Black Reinforcement of 41° F. Low Temperature Rubber."** L. R. Sperberg, L. A. Bliss, and C. C. Biard. Philblack Bulletin No. 15, December, 1948. 19 pages. This comprehensive report gives extensive test data comparing Philprene A with both GR-S and natural rubber in recipes reinforced with variable loadings of five different major types of carbon blacks. Test results are discussed and evaluated. **"Philblack O in Natural Rubber with Sulfur Content Reduced."** Philblack Bulletin No. 16, January, 1949. 3 pages. Data are presented comparing Philblack O and EPC black in a natural rubber tread recipe using four levels of sulfur black ratios. Results indicate Philblack O to give improved quality with reduction of sulfur below the usual 3% level.

"Causes of Industrial Peace under Collective Bargaining." Case Study No. 3. The Dewey & Almy Chemical Co. and the International Chemical Workers Union." Douglas McGregor and Joseph N. Scanlon. National Planning Association, 800 21st St., N.W., Washington 6, D. C. Paper, 88 pages Price $1. This report, the third in the Association's scheduled series of 15, describes in detail the nine-year growth of a healthy working relation between Dewey & Almy and the I.C.W.U.

"Overcoming Bloom on Neoprene Vulcanizates." BL-229, January 15, 1949. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 2 pages. Some factors affecting blooming on neoprene vulcanizates are discussed. This bloom may be masked by use of Heliozone in compounding, and the resulting wax bloom masks the white bloom which may develop on neoprene surfaces. Where wax is undesirable, blooming can be inhibited or eliminated by use of a carbon black of the long flow printing ink type having a high absorptive index.

"Specifications for Scrap Rubber, Revised January 11, 1949." Rubber Reclaimers Association, Inc., 250 W. 57th St., New York 19, N. Y. 4 pages. This revision of the scrap rubber specifications embodies several changes from the preceding 1945 issue, including: (1) consolidation and reorganization of standard grades for tires, tire parts, and tubes; (2) elimination of standard grades for solid tires, bicycle tires, shoes, and hose; (3) revisions in baling and grade separation requirements; and (4) various minor changes in grade specifications.

"Barrett Rubber Compounding Materials." Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 34 pages. This illustrated booklet describes the rubber compounding materials made by Barrett and gives specifications and information on applications and containers for each material.

"Stresses and Birefringence in Rubber Subjected to General Homogenous Strain." Publication No. 98. L. R. G. Treloar. British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts., England. 14 pages. Examination of photoelastic properties of rubber is extended to strain produced by stretching a sheet by different amounts in two directions at right angle. The observed double refraction is shown to depend on the stretch ratios and applied stresses, as predicted by the author's theory. This result establishes the fundamental laws governing the stress-optical properties of rubber under any type of strain.

"Monsanto Plasticizers." Monsanto Chemical Co., St. Louis 4, Mo. 82 pages. This illustrated booklet is divided into three main sections: (1) factors involved in choosing a plasticizer; (2) descriptions of Monsanto plasticizers, giving properties and applications; and (3) data comparing the different plasticizers in compatibility, performance, permanence, solubility, and other quality considerations.

Communications of the Netherlands Indies Rubber Research Institute, Buitenzorg, Java. **"Centrifuging of Latex."** G. J. Van der Bie. No. 48. 40 pages. Part I, "Experimental Results," was published in the November, 1946, issue of India RUBBER WORLD. Part II, "Some Theoretical Views," covers general considerations, latex properties, latex concentration by centrifuging, and related topics. **"Natural Vulcanization Accelerators in *Hevea* Latex."** R. F. A. Altman. No. 55. 20 pages. This paper relates to a systematic examination of the non-rubber constituents of *Hevea* latex to determine their effect as vulcanization accelerators. This paper was published in *Industrial and Engineering Chemistry*, 40, 241 (1948).

"The Rubber Formulary. A Service to Compounders." The Rubber Formulary, 115 George Hay Bldg., 1612 Nineteenth St., Bakersfield, Calif. 8 pages. This booklet describes a card recording and sorting service on rubber compounds published in the literature that is available to subscribers. A sample card is also enclosed.

"Link-Belt Overhead Trolley Conveyers." Book No. 2330. Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. 28 pages. This profusely illustrated booklet depicts a great variety of actual installations of the company's overhead trolley conveyers and shows the flexible adaptability of this type of conveyer. Also illustrated are the many types of specially made hangers used for suspending the product from the conveyer chain.

"Tinius Olsen Testing Machines for Plastics." Bulletin 36. Tinius Olsen Testing Machine Co., Willow Grove, Pa. 34 pages. This bulletin describes and illustrates the company's Plastiversal and Lo-Cap universal testers, electronic recorder, extensometers, compressometer and flexometer, accessories and tools, flow testers, torsion testers, stiffness testers, and other testing machines.

"NBC, An Inhibiter of Dynamic Exposure Cracking for GR-S." Report No. 49-1, February, 1949. D. B. Forman and M. F. Torrence. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 12 pages. This report gives formulations and test results showing NBC (nickel dibutyl dithiocarbamate) to be an effective inhibiter of both static and dynamic exposure cracking of GR-S compounds, particularly stocks containing carbon black. In neoprene, NBC improves heat resistance and retards sunlight discoloration.

"The Use of Sulfurous Acid as Coagulating Agent of *Hevea* Latex." G. J. van der Bie. Rubber Stichting publication No. 40 (1946). 23 pages. **"Careers in Engineering and Science."** Polytechnic Institute of Brooklyn, Brooklyn, N. Y. 70 pages. **"Publications of the National Research Council of Canada.** Supplementary List of Titles, 1947-1948. (N.R.C. Nos. 1413-1799)." National Research Council, Ottawa, Canada. 8 pages. **"Non-Toxic Rubber for Gas Masks."** S. H. Katz. ASTM Proceedings—Preprint No. 90, 1948. 6 pages. **"List of Inspected Gas, Oil, and Miscellaneous Appliances.** November 1948" and **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials.** December, 1948." 210 and 75 pages, respectively. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill.

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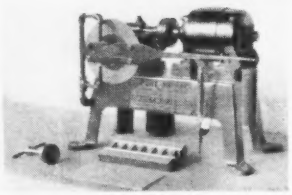

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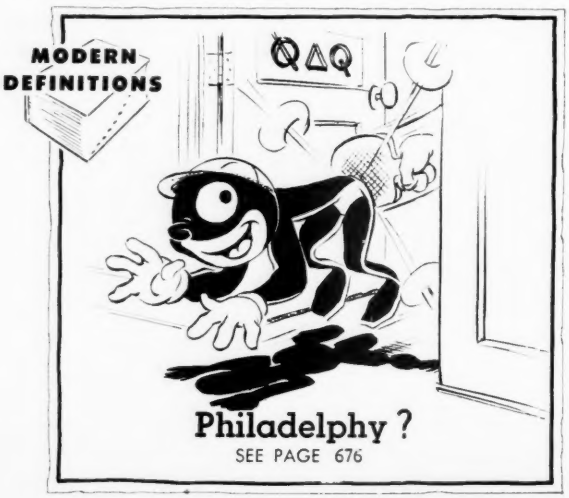

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Full-Spiral Tapping

(*Continued from page 724*)

stant relation between growth retardation and yield response to full-spiral tapping. No appreciable difference existed in bark renewal following upon the two systems.

4. There was no significant difference between the incidence of brown bast following upon six years' tapping with the two systems, nor was its occurrence unduly high. There was some evidence that panels under full-spiral fourth daily tapping were less susceptible to black thread disease than panels under half-spiral alternate daily tapping.

5. The main advantages claimed for the full-spiral system are increased yields with lower tapping costs. Under Liberian conditions such advantages may be attained in the first and possibly the second year after application. In subsequent years the adverse effect of the system upon the growth and the yield of most types of rubber is likely to be more than sufficient to offset these advantages and may even produce a lasting detrimental effect upon the trees.

Acknowledgments

The experiments described herein were originally designed in 1940 by the late T. A. Tengwall. The thanks of the authors are due to the various members of the research department of Firestone Plantations Co. who collaborated with them in collection of records and in constant field supervision of the experiments since their inception. To Firestone Plantations Co. the authors are indebted for kind permission to publish this paper.

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Molding semi-pneumatic lawn mower tires from reclaim is one of the difficult jobs done by the Grand Prairie Rubber Company of Grand Prairie, Texas. Tread ribs are easily torn; air checking is common; and mold maintenance costs are abnormally high. To meet competition production, engineers at Grand Prairie sprayed the molds with a dilute solution of DC Mold Release Emulsion No. 35. They found that it improves the flow of stock and eliminates air checking. Easy release cuts the number of rejects; "bleeders" stay open and the molds stay clean many times as long.

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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	Dec. 31	Jan. 29	Feb. 5	Feb. 12	Feb. 19	Feb. 26
No. 1 Contract:						
Apr.....	18.72	19.07	18.65	18.09	18.32	18.36
June.....	18.57	18.80	18.45	17.90	18.10	18.13
Aug.....	18.42	18.52	18.30	17.78	17.93	17.92
Oct.....	18.30	18.39	18.20	17.68	17.84	17.80
Dec..... 1950	18.20	18.25	18.10	17.58	17.70	17.70
Feb.....	18.10	18.15	18.00	17.48	17.60	17.60
Weekly Sales, Tons:						
No. 1 Contract...	1,790	1,900	3,780	5,180	4,140	2,730
Std. Contract...	210	420	340	270	40	20
Total..	2,000	2,320	4,120	5,450	4,180	2,750

RUBBER futures trading on the New York Commodity Exchange was listless during the first week of February, with prices declining slowly. This dullness was ascribed to the gap between spot and futures prices which discouraged futures trading. The second week saw a more rapid decline in prices, following reductions in the physical market and in other commodity markets. There was a marked shift of interest from the nearby months to the September contract at this time. This change resulted from the belief that manufacturers have enough supplies on hand to meet nearby needs, leaving only the distant months where availability is still questionable for market activity.

After falling to a monthly low on February 15, rubber futures prices recovered and rose during the third week, reflecting increased demand and stabilized prices in the physical market. The final week of February saw mixed trading and irregular price fluctuations as the market weighed reports of oversupply in producing areas with optimistic forecasts of high domestic consumption during the coming year.

April futures opened the month at 19.07¢ in the No. 1 Contract, declined to a low of 17.93¢ on February 15, and closed the month at 18.42¢. Other futures prices showed corresponding movement, with March futures reaching a low of 18.07¢ on February 15. In the Standard Contract, trading was limited to the period February-May and was very quiet, with only 680 tons sold during the month. February sales volume of trading in the No. 1 Contract was 16,450 tons, giving a total for both contracts of 17,130 tons. This increase in activity from the low figure of 12,620 tons sold during January reflected the switching operations to distant months.

New York Outside Market

WEEK-END CLOSING PRICES

	Dec. 31	Jan. 29	Feb. 5	Feb. 12	Feb. 19	Feb. 26
No. 1 R.S.S.:						
Feb....	18.88	19.13	18.88	18.38	18.38	18.38
Mar...	18.88	19.13	18.88	18.38	18.38	18.38
Apr.-June	18.63	19.00	18.88	18.38	18.25	18 25
July-Sep.	18.50	18.88	18.75	18.25	18.13	18.13
Oct.-Dec.		18.75	18.63	18.13	18.00	18.00
No. 3 R. S. S.	17.88	18.13	17.88	17.50	17.38	17.38
No. 2 Brown	15.00	15.00	15.13	14.88	15.25	15.25
Flat Bark	12.25	12.13	11.88	11.88	12.13	12.25

PRICE movements for rubber in the New York Outside Market during February followed the trend shown in the futures market. Prices declined during the first part of the month in the face of nonexistent demand at a time when manufacturers ordinarily enter the spot market to rebuild inventories against expanded spring output. Some upsurge in demand finally made itself felt during the latter part of February and prices recovered somewhat, although not rebounding to the levels at which they had started the month. Although representing an improvement over the preceding dullness, this demand was still scattered and limited to only a few grades.

The spot price for No. 1 R.S.S. started the month at 19.13¢, fell to the 18.13¢ level on February 8 and 9, a new low for the year, then recovered to close the month at 18.38¢. No. 3 R.S.S. spot prices fell from 18.13¢ on February 1 to a low of 17.25¢ on February 7-9, then rose to end the month at 17.38¢. Prices for No. 2 Brown started the month at 15.25¢, reached a low of 14.50¢ on February 8 and 9, and closed at 15.25¢ on February 28. Flat Bark prices showed the least change in the physical market, fluctuating in the 11.75-12.38¢ range during the month.

Latices

THE quality of most of the natural latex available here is, on the whole, quite excellent, being equal to or better than prewar quality, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's February *Rubber Report*. The American Society for Testing Materials is in process of preparing specifications that will act as non-mandatory standards for the latex industry. The current quality of the majority of imports is such that no difficulty appears anticipated in meeting these standards, which with appropriate test methods will do much to eliminate the confusion existing over quality characteristics of latex.

Mr. Nolan gives revised November, 1948, statistics for *Hevea* latex, as follows: imports, 814 long tons, dry weight; consumption, 2,482 long tons; and month end stocks, 9,651 long tons. Estimated December figures are: imports, 4,216 long tons; consumption, 2,328 long tons; and month-end stocks, 11,165 long tons; giving yearly totals for imports of 32,632 long tons, and consumption of 25,331 long tons. December production of GR-S latex is shown as 1,802 long tons, for a yearly total of 20,732 long tons. Production of GR-S latex declined in January to 1,297 long tons. Mr. Nolan gives October and November production of neoprene latex as 465 and 378 long tons, respectively, but no figure for December is as yet available.

SCRAP RUBBER

LIMITED trading in scrap rubber was reported both in the East and at Akron in February. Tires and tubes moved sporadically, with the best demand being noted for red tubes. Dealers tried to move shipments of black tubes with the red, but were only moderately successful. Mixed tires moved fairly steadily; while peelings were taken mainly for foreign consumption.

Inquiries from abroad were quite numerous, particularly from Spain, and some business with Spain took place, usually on a barter basis because of dollar shortages. It was reported that the Japanese Board of Trade would not purchase any more rubber scrap until March, but has bought some small tonnages of vinyl scrap on an experimental basis. If this plastic scrap proves satisfactory, larger purchases are expected to be made in the near future.

Following are dealers' buying prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points (Per Net Ton)	Akron, O. (Per Net Ton)
Mixed auto tires.....	$11.50	$13.00
S-A, G passenger (natural)..	nom.	nom.
Truck (natural)	nom.	nom.
Peelings (natural), No. 1....	50.00	50.00
2.....	31.00	31.00
3.....	29.00	29.00
	(¢ per Lb.)	
Mixed auto tubes.....	3.50	3.00
Red passenger tubes.....	7.00	7.25
Black passenger tubes.....	3.75	4.00
Truck tubes.....	3.75	3.75
Mixed puncture-proof tubes..	0.50	0.50
Air brake hose.....	nom.	nom.

RECLAIMED RUBBER

THE reclaimed rubber market during February remained unchanged from that of the preceding month. Production and consumption of reclaim continued at high levels, and exports are expected to show gradual improvement. The industry in general remains optimistic over the outlook for the year, and good business is expected to continue.

Final November and preliminary December statistics on the domestic reclaimed rubber industry are now available. Production of reclaim during November totaled 23,050 long tons; consumption, 22,170 long tons; exports, 1,210 long tons; and month-end stocks, 33,378 long tons. Preliminary figures for December show a production of 21,396 long tons; consumption, 20,122 long tons; exports, 900 long tons; and end-of-month stocks, 34,702 long tons.

No changes occurred in reclaimed rubber prices last month, and current prices are listed below:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.5 / 9
Peel	1.18-1.20	8.5 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.75
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

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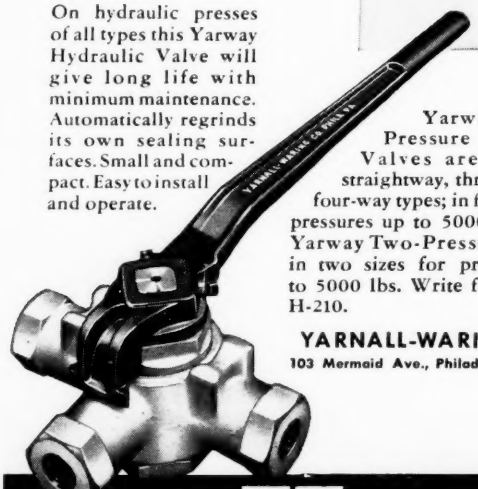

Yarway Single-Pressure Hydraulic Valves are made in straightway, three-way and four-way types; in five sizes for pressures up to 5000 lbs. Also Yarway Two-Pressure Valves in two sizes for pressures up to 5000 lbs. Write for Bulletin H-210.

YARNALL-WARING CO.

103 Mermaid Ave., Philadelphia 18, Pa.

YARWAY

Improved Type

HYDRAULIC VALVE

LITTLEJOHN & CO., Inc.

120 WALL STREET

NEW YORK 5, N. Y.

CRUDE & SYNTHETIC RUBBER

NATURAL & SYNTHETIC LATEX

Balata, Gutta Percha
Pontianak—Gutta Siak
All Grades of
Brazilian & Far Eastern
Chewing Gum Raw Materials

76%, or 850,100,000 pounds, were filament yarn, and the remaining 24% were staple. All divisions of the industry achieved new production peaks. Production of high-tenacity tire yarn in 1948 totaled 263,100,000 pounds, or 23,300,000 pounds more than in 1947, with the greatest poundage increase attained by the 1650 denier yarn. The 1948 output of 1650 and heavier denier types increased 45% over 1947 production as a result of increasing use in tires, hose, belting, and related products. Of the total production, 240,500,000 pounds of yarn were shipped to tire manufacturers in 1948, an increase of 10% over the previous year's figure and representing 45.5% of all domestic yarn shipments. Viscose and cupra yarn exports during 1948 amounted to 12,040,000 pounds, of which 35% were tire-type yarns.

No changes in rayon tire yarn and fabric prices occurred during February, and current prices are listed below:

Rayon Fabrics

Tire Yarns:		
1100/480	80.55	80.56
1100/490	.57	
1150/490	.57	
1650/720	.54	.56
1650/980	.56	
1900/980	.56	
2200/960	.55	
2200/980	.55	
Tire Fabrics:		
1100/490/2	.71	
1650/980/2	.685	.70
2200/980/2	.67	

COTTON AND FABRICS

New York Cotton Exchange
Week-End Closing Prices

	Dec. 31	Jan. 29	Feb. 5	Feb. 12	Feb. 19	Feb. 26
May	32.13	32.46	32.06	31.82	32.19	32.28
July	31.10	31.37	30.90	30.68	31.03	31.08
Oct.	28.58	28.72	28.26	27.98	28.32	28.16
Dec.	28.43	28.49	28.01	27.76	28.10	27.95
1950						
Mar.	28.22	28.36	27.90	27.64	27.97	27.83
May	28.04	28.13	27.70	27.43	27.74	27.60

THE cotton market on the New York Cotton Exchange last month was nervous and erratic with professional interests providing most of the activity and controlling the market during the last two weeks of February. After a decline during the first seven days of trading, following the trend in other commodity markets, cotton prices rebounded to reach new heights. Factors contributing to this advance were: (1) increased exports, with Japanese buyers said to have taken at least 50,000 bales; (2) the ECA announcement that $30,150,000 had been allotted to France, Bizonia, and Holland for new cotton purchases believed to be about 175,000 bales, and that Italy will soon receive a grant for cotton purchases; (3) reports that the House agriculture committee would fix future cotton loans at 90% of parity; and (4) increased hedging and covering. Mills purchased heavily during the price decline and remained quiet the balance of the month.

The 15/16-inch middling spot price started the month at 33.63¢, fell to a low of 32.04¢ on February 8, reached a high of 33.82¢ on February 23, and closed the month at 33.43¢. May futures began the month at 32.41¢, hit a low of 31.23¢ on February 8, and recovered to close the month at 32.10¢.

Fabrics

Business in wide industrial fabrics continued on a close delivery basis during February. Most orders were booked for immediate delivery, and March contracts were noted only in certain fabrics, such as headlinings, chafers, and hose and belting ducks. Mounting inventories at the mill level are causing some concern among producers. It was reported that some of the large mills were still operating on a three-shift basis, but working only four days a week; while others continued on a two-shift basis for a five-day working week.

Sateens sold in a moderate way to the coating and upholstery trades, but some slackening was noted from the pace of preceding weeks. Broken twills were most active in the coating trade and were in relatively tight supply. Headlinings moved strongly to the automotive trade at firm prices. Wide drills were fairly active and sold into March; while some pick-up in activity of wide and numbered ducks became apparent. Chafers were bought by the rubber industry in late March deliveries, and osnaburgs showed renewed activity in sales made into the second quarter.

Current prices for cotton fabrics are given in the following listing:

Cotton Fabrics

Drills		
59-inch 1.85-yd.	yd.	$0.38
2.25-yd.		.34
Ducks		
38-inch 1.84-yd. S. F.	yd.	.425
2.00-yd. D. F.		.325
40-inch 1.45-yd. S. F.		.4338
51.5-inch 1.35-yd. S. F.		.52
Hose and belting		.665
Osnaburgs		
40-inch 3.65-yd.	yd.	.1525
Raincoat Fabrics		
Bombazine, 64 x 60 5.35-yd	yd.	.235
Print cloth, 38¼-inch, 64 x 60		.155
Sheeting, 48-inch, 4.17-yd.		.23
52-inch 3.85-yd.		.2488
57-inch 3.47-yd.		.2763
60-inch 3.30-yd.		.2913
Chafer Fabrics		
14-oz. sq. yd. Pl.	lb.	.73
11-65-oz. sq. yd. S		.66
10-80-oz. sq. yd. S.		.68
8.9-oz. sq. yd. S.		.7075
14-oz. sq. yd. S.		.65
Other Fabrics		
Headlining, 59-inch 1.35-yd. 2-ply	yd.	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.58
58-inch 1.21-yd.		.6375

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	January
15° & 16° D. C. Passenger	1949
15x4.00E	2,555
16x4.00E	241,635
15x4.50E	4,592
16x4.50E	100,215
15x5.00E	100,023
16x5.00F	24,379
15x5.50F	29,054
16x5.50F	9,276
16x6.00F	7,443
16x4.00E—Hump	14,082
16x4.50E—Hump	24,094
15x4½-K	39,518
16x4½-K	89,492
15x5-K	384,501
16x5-K	17,455
15x5½-K	236,413
16x5½-K	473
15x6-L	148,549
15x6½-L	113,120
15x4½-K—Hump	217,316
15x5-K—Hump	112,500
15x5½-K—Hump	108,560
17° & Over	
18x2.15B	2,010
Truck-Bus	
17x5.0	31,393
18x5.0	21,945
20x5.0	27,840
20x5.00S	2,297
17x5.5	14,644
17x6.0	1,549
20x6.0	122,265
20x6.00S	72,998
20x6.00T	2,092
24x6.00T	628
15x6.50T	772
20x6.50T	18,963
15x7.0	848
20x7.0	15,309
15x7.00T	166
20x7.00T	8,779
22x7.00T	2,507
20x7.33V	6,982
22x7.33V	1,245
24x7.33V	143
15x7.5	100
20x7.5	7,147
22x7.5	6,281
24x7.5	1,589
20x7.50V—Flat Base	10,136
22x7.50V—Flat Base	2,216
20x8.0	218
22x8.0	548
20x8.00V	8,851
22x8.00V	1,718
24x8.00V	190
20x8.37V	609
24x8.37V	460
20x10.0	2,337
Semi D. C. Truck	
15x5.50F	67,162
16x5.50F	41,988
Tractor & Implement	
12x2.50C	23,216
12x3.00D	39,764
15x3.00D	24,054
16x3.00D	9,799
19x3.00D	32,399
30x3.00D	979
36x3.00D	4,889
16x4.25KA	1,340
36x4.50E	1,435
12x5.00JA	50
24x5.50R	7,194
18x5.50F	9,987
20x5.50F	6,969
24x8.00T	5,674
W5-30	7,050
W7-24	9,382
W8-24	8,425
W8-24 (H)	6,784
W8-36	4,024
W9-24	3,409
W9-28	32,219
W9-36	1,743
W9-38	4,446
W10-24	1,467
W10-24 (H)	920
W10-28	5,631
W10-28 (H)	1,012
W10-38	6,623
DW9-38	9,871
DW10-26	261
DW10-36	1,187
DW10-38	7,871
DW10-42	1,459
DW11-38	2,400
DW12-30	4,832
DW14-30	677
Industrial	
9x4.00E	81
10x5.00F	22
Earth Mover	
24x11.25	181
24x13.00	179
24x15.00	214
25x15.00	281
29x17.00	506
33x19.50	50
33x22.00	165
Total	2,845,892

United States Motor Vehicle Factory Sales

(Number of Vehicles)

1946	Passenger Cars	Motor Trucks	Motor Coaches	Total
Total	2,148,699	930,760	10,091	3,089,550
1947				
Total	3,558,178	1,220,634	18,838	4,797,650
1948				
Jan.	305,081	99,200	1,382	405,663
Feb.	274,847	107,054	1,101	383,002
Mar.	349,998	140,606	1,430	492,034
Apr.	308,071	128,963	1,056	438,090
May	225,461	111,789	1,288	338,538
June	312,406	117,572	1,068	431,046
July	356,764	116,780	1,012	474,556
Aug.	348,822	111,760	771	461,353
Sept.	301,170	111,224	1,143	413,537
Oct.	383,755	107,369	679	491,803
Nov.	364,440	103,837	545	468,822
Dec.	378,455	107,702	824	486,981
Total	3,909,270	1,363,856	12,299	5,285,425

Source: Automobile Manufacturers' Association, Detroit, Mich.

VULCANIZED VEGETABLE OILS

—RUBBER SUBSTITUTES—

•

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

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A LONG ESTABLISHED AND PROVEN PRODUCT

Represented by:

HARWICK STANDARD CHEMICAL CO.

Akron — Boston — Trenton — Chicago — Denver — Los Angeles

Regular and Special Constructions of

COTTON FABRICS

Single Filling **Double Filling**

and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03¾	/ $0.0425
Rottenstone, domestic	ton	36.00	/ 43.00

Accelerators, Organic

A-10	lb.	.40	/ .47
A-19	lb.	.52	/ .58
A-32	lb.	.59	/ .69
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator 8	lb.	.83	
49	lb.	.44	/ .45
89	lb.	1.20	
122	lb.	1.30	
552	lb.	1.80	
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.75	
Advan	lb.	.55	
Aero AC 50	lb.	.50	/ .56
165	lb.	.37	/ .39
Altax	lb.	.35	/ .37
Arazate	lb.	2.16	
Beutene	lb.	.59	/ .64
B-J-F	lb.	.27	/ .32
Butasan	lb.	1.00	
Butazate	lb.	1.00	
Butyl Eight	lb.	1.00	/ 1.05
Zimate	lb.	1.00	
Captax	lb.	.27	/ .345
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Cuprax	lb.	.60	/ .62
Diesterex N	lb.	.50	/ .57
DOTG (diorthotolylguanidine)	lb.	.44	/ .50
DPG (diphenylguanidine)	lb.	.39	/ .45
El-Sixty	lb.	.39	/ .46
Ethasan	lb.	1.00	
Ethazate	lb.	1.00	
Ethyl Thiurad	lb.	1.00	
Tuads	lb.	1.00	
Tuex	lb.	1.00	
Zimate	lb.	1.00	
Good-Rite Erie	lb.	.32	/ .34
Hepteen	lb.	.42	/ .48
Base	lb.	1.80	/ 1.90
Ledate	lb.	1.00	
M-B-T	lb.	.27	/ .33
M-B-T-S	lb.	.35	/ .41
Mertax	lb.	.37	/ 1.44
Methasan	lb.	1.00	
Methazate	lb.	1.00	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Zimate	lb.	1.00	
Monex	lb.	1.10	
Mono-Thiurad	lb.	1.10	
Morfex 33	lb.	.53	/ .58
O-X-A-F	lb.	.34	/ .39
Pentex	lb.	.74	/ .84
Flour	lb.	.1225	/ .1325
Phenex	lb.	.40	/ .45
Pipazate	lb.	1.53	
Rodiform products	lb.	1.00	/ 3.00
Rotax	lb.	.39	/ .41
S. A. 52	lb.	1.10	
57, 62, 67, 77	lb.	1.00	
66	lb.	1.45	
Safex	lb.	1.15	
Santocure	lb.	.53	/ .60
Selazate	lb.	1.45	
Selenac	lb.	1.45	
SPDX-GH	lb.	.64	/ .69
Tellurac	lb.	1.45	
Tepidone	lb.	.55	
Tetrone	lb.	1.25	
A	lb.	1.85	
Thiofide	lb.	.35	/ .42
Thionex	lb.	1.10	
Thiotax	lb.	.27	/ .34
Thiurad	lb.	1.10	
Thuram E	lb.	1.00	
M	lb.	1.10	
Trimene	lb.	.54	/ .64
Base	lb.	1.03	/ 1.18
Tuex	lb.	1.10	
2-MT	lb.	.53	/ .55
Ultex	lb.	1.00	/ 1.10
Ureka	lb.	.55	/ .62
Blend B	lb.	.55	/ .62
C	lb.	.52	/ .59
Vulcanex	lb.	.45	
Z-B-X	lb.	2.45	
Zenite	lb.	.33	/ .35
A	lb.	.42	/ .44
B	lb.	.39	/ .41
Special	lb.	.34	/ .36
Zetax	lb.	.33	/ .36

Accelerator-Activators, Inorganic

Lime hydrated	ton	8.50	/ 13.50
Litharge, comml	lb.	.2225	/ .225
Eagle, sublimed	lb.	.2225	/ .2235
Red lead, comml.	lb.	.2325	/ .2475
Eagle	lb.	.2325	
White lead, basic	lb.	.205	/ .215
Eagle	lb.	.205	/ .215
White lead, silicate	lb.	.214	/ .25
Eagle	lb.	.214	/ .2475
Zinc oxide, comml.†	lb.	.155	/ .185

Accelerator-Activators, Organic

Barak	lb.	$0.60	
Curade	lb.	.57	/ $0.59
D-B-A	lb.	1.95	
Delac P	lb.	.45	/ .52
Emersol 110	lb.	.175	/ .185
120	lb.	.18	/ .19
130	lb.	.2025	/ .2125
210 Elaine	lb.	.14	/ .1625
Emery 600	lb.	.0925	/ .115
Guantal	lb.	.47	/ .54
HyFac 430	lb.	18	/ .19
431	lb.	.195	/ .205
Laurex	lb.	.28	/ .31
Lead oleate	lb.	.33	
MODX	lb.	.295	/ 345
NA-11	lb.	.65	
Palmalene	lb.	.35	
Plastone	lb.	.27	/ .30
Polyac	lb.	1.40	
Ridacto	lb.	.22	/ .24
Seedine	lb.	.1485	/ .1705
SOAC-KL	lb.	.08	/ .11
Stearex Beads	lb.	.14⅞	/ .15⅜
Stearic acid, single pressed	lb.	.175	/ .185
Double pressed	lb.	.18	/ .19
Triple pressed	lb.	.2025	/ .2125
Stearite	lb.	.14⅞	
Tonox	lb.	.50	/ .59
Zinc stearate	lb.	.39	/ .40

Alkalies

Caustic soda, flake	100 lbs.	3.45	/ 6.90
Liquid, 50%	100 lbs.	2.40	/ 2.50
Solid	100 lbs.	3.05	/ 5.60

Antioxidants

AgeRite Alba	lb.	2.20	/ 2.30
Gel	lb.	.58	/ .60
H.P	lb.	.61	/ .63
Hipar	lb.	.82	/ .84
Powder	lb.	.46	/ .48
Resin	lb.	.63	/ .65
D	lb.	.46	/ .48
Stalite	lb.	.46	/ .48
White	lb.	1.40	/ 1.50
Akroflex C	lb.	.61	/ .63
Albasan	lb.	.69	/ .73
Aminox	lb.	.46	/ .55
Antisol	lb.	.23	/ .24
Antox	lb.	.54	/ .56
Aranox	lb.	2.15	
Betanox Special	lb.	.68	/ .77
B-L-E	lb.	.46	/ .55
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibiter X-872-L	lb.	1.75	
Deenex	lb.	.95	/ 1.05
Flectol H	lb.	.46	/ .53
Flexamine	lb.	.61	/ .70
Heliozone	lb.	.25	/ .26
Mekon micro-crystalline wax, amber	lb.	.14	/ .16
Black	lb.	.135	/ .155
Yellow	lb.	.155	.175
Neozone (standard)	lb.	.66	/ .68
A	lb.	.48	/ .50
C	lb.	.52	/ .54
D	lb.	.46	/ .48
DL	lb.	.48	/ .50
Parazone	lb.	.75	
Perflectol	lb.	.61	/ .68
Permalux	lb.	1.65	
Rio Resin	lb.	.50	/ .52
Santoflex 35	lb.	.61	/ .68
B	lb.	.46	/ .53
Santovar-O	lb.	1.10	/ 1.17
Santowhite Crystals	lb.	1.73	/ 1.80
MK	lb.	1.40	/ 1.52
MKS	lb.	1.25	/ 1.37
S.C.R.	lb.	.32	/ .34
Solux	lb.	2.15	
Stabilite	lb.	.46	/ .48
Alba	lb.	.69	/ .74
L	lb.	.48	/ .50
Sunproof	lb.	.25	/ .30
Improved	lb.	.23	/ .28
Jr.	lb.	.18	/ .23
Thermoflex A	lb.	.82	/ .84
Tonox	lb.	.50	/ .59
Tysonite	lb.	.215	/ .2225
V-G-B	lb.	.55	/ .64
Zenite	lb.	.33	/ .35

Antiseptics

Copper naphthenate, 6-8%	lb.	.2275	/ .2325
G-4	lb.	1.15	/ 2.70
G-11	lb.	3.50	
Pentachlorophenol	lb.	.20	/ .25
Resorcinol, technical	lb.	.75	
Soligen Drier-Copper 8%	lb.	.2325	
-Zinc 8%	lb.	.22	
Zinc naphthenate, 8-10%	lb.	.215	/ .2675

Blowing Agents

Ammonium, bicarbonate	lb.	.055	/ .06
Carbonate	lb.	.185	/ .22
Sodium bicarbonate	100 lbs.	1.95	/ 3.00
Carbonate, technical	100 lbs.	1.25	/ 4.45
Unicel	lb.	.60	
ND	lb.	1.00	
S	lb.	.25	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed; contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Bonding Agents

MDI	lb.	$7.00	/ $7.75
50	lb.	3.50	/ 4.00
Ty-Ply Q. S.	gal.	6.75	/ 8.00

Brake Lining Saturants

B.R.T. No. 3	lb.	.024	/ .025
Resinex L-5	lb.	.0225	/ .03

Carbon Blacks

Conductive Channel—CC

Continental R-20, -40	lb.	.055	/ .102
Kosmos/Dixie	lb.	.15	/ .185
Spheron C	lb.	.12	/ .165
I	lb.	.10	/ .145
N	lb.	.22	/ .25
Voltex	lb.	.15	/ .185

Easy Processing Channel—EPC

Continental AA	lb.	.055	/ .102
Kosmobile 77/Dixiedensed 77	lb.	.07	/ .1125
Micronex W-6	lb.	.07	/ .1125
Spheron #9	lb.	.074	/ .117
Witco #12	lb.	.055	/ .102
Wyex	lb.	.07	/ .115

Hard Processing Channel—HPC

Continental F	lb.	.055	/ .102
HX	lb.	.07	/ .115
Kosmobile S/Dixiedensed S	lb.	.07	/ .1125
Micronex Mk. II	lb.	.07	/ .1125
Spheron #4	lb.	.074	/ .117
Witco #6	lb.	.555	/ .102

Medium Processing Channel—MPC

Arrow TX	lb.	.07	/ .115
Continental A	lb.	.055	/ .102
Kosmobile S-66 Dixiedensed S-66	lb.	.07	/ .1125
Micronex Standard	lb.	.07	/ .1125
Spheron #6	lb.	.074	/ .117
Witco #1	lb.	.055	/ .102

Conductive Furnace—CF

Statex A	lb.	.08	/ .10

Fast Extruding Furnace—FEF

Statex M	lb.	.055	/ .095

Fine Furnace—FF

Statex B	lb.	.0575	/ .0975
Sterling 99	lb.	.065	/ .105

High Abrasion Furnace—HAF

Philblack O	lb.	.07	/ .1145
Vulcan #1, #3	lb.	.074	/ .117

High Modulus Furnace—HMF

Continex HMF	lb.	.05	/ .075
Kosmos 40/Dixie 40	lb.	.05	/ .09
Kosmos 50/Dixie 50	lb.	.055	/ .095
Modulex	lb.	.05	/ .075
Philblack A	lb.	.0525	/ .095
Statex 93	lb.	.05	/ .09
Sterling L	lb.	.05	/ .09
SO	lb.	.055	/ .095

Reinforcing Furnace—RF

Kosmos 60/Dixie 60	lb.	.074	/ .1125

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.035	/ .055
Essex	lb.	.035	/ .055
Furnex	lb.	.035	/ .075
Gastex	lb.	.035	/ .075
Kosmos 20/Dixie 20	lb.	.035	/ .075
Pelletex	lb.	.035	/ .075
Sterling NS, R, S	lb.	.035	/ .075

Very Fine Furnace—VFF

Statex K	lb.	.074	/ .1125
Sterling 105	lb.	.074	/ .12

Fine Thermal—FT

P-33	lb.	.05	

Medium Thermal—MT

Thermax	lb.	.03	
Stainless	lb.	.035	

Chemical Stabilizers

Lead stearate	lb.	.40	/ .42
Vanstay 16, 25	lb.	.33	/ .35
White lead, basic	lb.	.205	/ .215

Colors

Black

Black Paste #25	lb.	.22	/ .40
BK Iron Oxides	lb.	.03	/ .11
Lampblack, comml.	lb.	.07	/ .30
Superjet	lb.	.0675	/ .1025
Mapico	lb.	.1075	/ .11
MB Mineral Blacks	lb.	.0315	/ .067

Blue

Du Pont	lb.	.75	/ 3.95
Heveatex pastes	lb.	.80	/ 1.45
Stan-Tone	lb.	1.00	/ 1.35
Toners	lb.	.30	/ 3.50

Brown

Brown Paste #5, #10	lb.	.35	/ .45
Iron oxide, brown	lb.	.03	/ .152
Mapico	lb.	.125	
Tan	lb.	.195	

Porcelain Glove Forms

— for dipped rubber gloves, including linemen's or electricians' gloves and surgeons' gloves. Some are made from our own stock molds and others from customers' molds.

Write today for our new catalog covering rubber glove and other forms for dipped rubber goods. Prompt attention given to requests for quotations based on your specifications or stock items.

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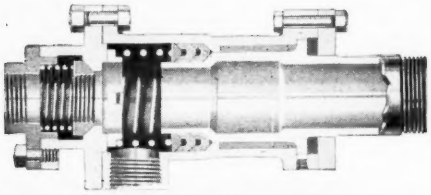
CHARLES T. WILSON CO., INC.
120 WALL STREET, NEW YORK 5, N Y

AKRON BOSTON LOS ANGELES TORONTO

Metallic brown	lb.	$0.03	/ $0.0325
Plastics brown	lb.	.0565	/ .065
Sienna, burnt	lb.	.0375	/ .15
Raw	lb.	.04	/ .1275
Umber, burnt	lb.	.0475	/ .0675
Raw	lb.	.0375	/ .06
Green			
Chrome	lb.	.13	/ .4875
Oxide	lb.	.33	/ .40
Du Pont	lb.	1.10	/ 3.20
G-4099	lb.	.325	/ .33
G-5299, -6099	lb.	.315	/ .32
G-7599	lb.	.38	/ .385
G-9869	lb.	.75	/ .90
G-9976	lb.	.85	/ 1.00
Heveatex pastes	lb.	.95	/ 1.85
Stan-Tone	lb.	1.50	/ 3.30
Toners	lb.	.35	/ 4.00
Orange			
Du Pont	lb.	2.75	
Orange Paste #13	lb.	1.35	/ 1.50
Stan-Tone	lb.	1.65	/ 2.25
Toners	lb.	.30	/ 1.50
Red			
Antimony trisulfide	lb.	.55	/ .68
R. M. P. Sulfur Free	lb.	.63	/ .68
R.P.M. No. 3	lb.	.55	/ .60
Cadmium red lithopone	lb.	1.09	/ 1.49
Cadmolith Red	lb.	.92	/ 1.00
Du Pont	lb.	.34	/ 1.85
Indian Red	lb.	.115	/ .1175
Iron oxide, red	lb.	.0525	/ .1175
Light	lb.	.115	/ .1175
Mapico	lb.	.115	/ .1175
Red Paste #17, I-2	lb.	.95	/ 1.10
Rub-Er-Red	lb.	.0975	
Stan-Tone	lb.	1.10	/ 3.05
Toners	lb.	.25	/ 4.15
Tuscan Red	lb.	.245	/ .25
Venetian Red	lb.	.035	/ .049
White			
Antimony oxide	lb.	.3575	/ .37
Lithopone, titanated	lb.	.0825	/ .085
► Cryptone BT	lb.	.0825	/ .085
Titanium pigments:			
Rayox LW	lb.	.195	/ .205
R-110	lb.	.215	/ .225
Ti-Cal	lb.	.075	/ .0825
Ti-Pure	lb.	.195	/ .225
Titanox-A, -AA	lb.	.195	/ .20
RA, RA-10	lb.	.0775	/ .0825
RC	lb.	.215	/ .225
RC-HT	lb.	.075	/ .08
Zopaque	lb.	.195	/ .205
Zinc oxide, commil	lb.	.155	/ .185
Azo ZZZ-11, -44, -55	lb.	.11	/ .12
-66	lb.	.1325	/ .1425
35% leaded	lb.	.12⅜	/ .13⅝
Eagle AAA, lead free	lb.	.155	/ .1575
5% leaded	lb.	.155	/ .1575
35% leaded	lb.	.165	/ .1675
50% leaded	lb.	.16⅞	/ .17⅛
Florence Green Seal-8	lb.	.1725	/ .175
Red Seal-9	lb.	.1675	/ .17
White Seal-7	lb.	.1775	/ .18
Horsehead XX-4, -78	lb.	.155	/ .1575
Kadox-15, 17, -72	lb.	.155	/ .1575
-25	lb.	.1775	/ .18
Lehigh, 35% leaded	lb.	.17⅛	/ .17⅜
50% leaded	lb.	.17⅞	/ .18⅛
Protox-166	lb.	.155	/ .1575
St. Joe, lead free	lb.	.155	/ .1575
Standard, 5% leaded	lb.	.155	/ .1575
Zinc sulfide, commil	lb.	.135	/ .1375
Cryptone ZS-800	lb.	.135	/ .1375
Yellow			
Cadmium yellow lithopone	lb.	.95	
Cadmolith Yellow	lb.	.92	/ .100
Chrome	lb.	.34	
Du Pont	lb.	.34	/ 1.85
Iron oxide, yellow	lb.	.0141	/ .0925
Mapico	lb.	.09	/ .0925
Ocher, yellow	lb.	.0125	/ .0275
Stan-Tone	lb.	1.00	/ 1.55
Toners	lb.	.50	/ 1.37
Yellow D	lb.	1.25	/ 1.35
Dispersing Agents			
Darvan Nos. 1, 2	lb.	.21	/ .30
Daxad Nos. 11, 23, 27	lb.	.19	/ .35
No. 21	lb.	.08	/ .25
Stan-Chem	lb.	.1225	/ .2587
Triton R-100	lb.	.12	/ .25
Dusting Agents			
Glycerized Liquid Lubricant, concentrated	gal.	1.75	
Lubrex	lb.	.25	/ .30
Mica	lb.	.0675	/ .075
Pyrax A	ton	12.50	
W. A	ton	15.00	
Snow Crest Talc	ton	33.00	/ 35.00
Vanfre	gal.	2.00	/ 2.50
Zinc stearate	lb.	.39	/ .40
Extenders			
Advagum	lb.	.65	
B. R. S. 700	lb.	.0175	/ .026
B. R. T. No. 7	lb.	.0265	/ .0275
Califlux 510, 550	lb.	.025	/ .0325
G. P.	lb.	.0125	/ .02
Dielex B	lb.	.06	
Factice, Amberex	lb.	$0.30	/ $0.38
Brown	lb.	.12	/ .33
Neophax	lb.	.18	/ 1.35
Ozonite	lb.	.2365	
White	lb.	.13	/ .32
Mineral Rubbers			
Black Diamond	ton	25.00	/ 30.00
Extender 600	lb.	.18	
Hard Hydrocarbon	ton	44.50	46.50
No. 38	ton	25.00	
Parmr	ton	21.00	/ 29.00
Nuba No. 1, 2	lb.	.04	
No. 3X	lb.	.065	
Rubber substitute, brown	lb.	.18	/ .317
White	lb.	.16	/ .33
Synthetic 100	lb.	.41	
Vinsol Resin	lb.	.025	/ .035
Vistanex	lb.	.32	
Fillers, Inert			
Asbestos fiber	ton	28.50	/ 88.00
Barytes, floated, white	ton	35.05	49.65
Off-color, domestic	ton	19.00	/ 20.00
No. 1	ton	33.35	/ 47.75
2	ton	31.35	
Blanc fixe	ton	77.50	/ 113.00
Clays:			
Aluminum Flake	ton	16.00	22.00
#5	ton	21.00	
Burgess No. 20	ton	33.00	
No. 30	ton	35.00	
Iceberg	ton	50.00	
Champion	ton	14.00	
Crown	ton	13.00	/ 29.50
Hi-White R	ton	15.00	33.00
Hydratex R	ton	30.00	
Paragon	ton	13.50	/ 31.50
McNamee	ton	13.50	
Stan-Tex White	ton	25.00	
Stellar-R	ton	30.00	
Suprex	ton	14.00	/ 33.00
W-1291 English	ton	53.00	55.00
Cryptone BA, CB, MS	lb.	.08	.0825
Flocks:			
Cotton, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Fabrifil X-24-G	lb.	.095	
X-24-W	lb.	.135	
Filfloc 6000	lb.	.16	
F-40-900	lb.	.105	
Solka-Floc	lb.	.05	.15
Kalite	ton	40.00	
Lead sulfate, basic	lb.	.2025	/ .2125
Lithopone, commil	lb.	.06⅜	/ .0675
Albalith	lb.	.06⅜	.06⅜
Astrolith	lb.	.06⅜	/ .0675
Eagle	lb.	.0725	/ .075
Sunolith	lb.	.06⅜	/ .0675
Mica	lb.	.0675	/ .075
No. 1 Silica	ton	40.00	
Pyrax A	ton	12.50	
W. A	ton	15.00	
Silical	ton	7.00	/ 55.00
SL Slate Flour	ton	17.00	27.00
Suspenso	ton	22.00	
Swansdown	ton	20.00	
Terra Alba 1319	ton	27.00	
Ti-Cal	lb.	.0675	
Titanox-C, RCHT	lb.	.07	.075
Whiting, limestone	ton	11.00	27.50
Paxinosa	ton	9.50	16.50
Witco	ton	6.50	
Finishes			
Black-Out	gal.	4.50	/ 8.00
Flexible Rubber Paints	gal.	4.00	9.00
Flocks			
Cotton, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Rayon, colored	lb.	.90	1.50
White	lb.	.75	1.25
Rubber lacquer, clear	gal.	1.00	2.00
Colored	gal.	2.00	3.50
Shoe varnish	gal.	1.45	
Talc	ton	14.00	/ 32.00
Vinylum #45	lb.	1.50	1.65
Wax, Bees	lb.	.53	.73
Carnauba	lb.	.67	1.07
Montan	lb.	.30	.65
No. 118, colors	gal.	.86	1.41
Neutral	gal.	.76	1.31
Van Wax	gal.	1.25	1.30
Latex Compounding Ingredients			
Accelerator 89	lb.	1.20	
122	lb.	1.30	
552	lb.	1.80	
Acrysol GS, 15% solids	lb.	.145	/ .22
Advawet 10	lb.	.35	
Aerosol	lb.	.35	
AgeRite Dispersions	lb.	.60	/ 2.25
Amberex Solutions	lb.	.1675	/ .18
Aquablaks	lb.	.08	/ .17
Aquarex BBX, Conc	lb.	.78	
D	lb.	.76	
MDL Paste	lb.	.30	
ME	lb.	.92	
NS	lb.	.60	
SMO	lb.	.50	
Areskap 50	lb.	.30	/ .38
100, dry	lb.	.60	/ .72
Aresket 240	lb.	.30	/ .38
300, dry	lb.	.60	/ .72
Aresklene 375	lb.	.42	/ .57
400, dry	lb.	.70	/ .84
Black No. 25, dispersed	lb.	.22	.24
Casein	lb.	.275	/ .37
CW-12	lb.	.85	
CW-37	lb.	$0.70	
Darex Copolymers Nos. 3-L, 9-L, X34-L, X44-L	lb.	.365	/ $0.50
Dispersed Sulfur No. 2	lb.	.10	/ .12
Ethyl Thiurad	lb.	1.00	
Factice dispersions	lb.	.23	/ .44
Laton L	lb.	.075	/ .0775
Ludox	lb.	.1675	/ .1925
Marmix	lb.	.36	/ .43
Micronex, colloidal	lb.	.06	/ .07
pHR Latex Chemical	lb.	2.00	
Pip-Pip	lb.	1.63	
R-2 Crystals	lb.	1.55	
Resin Emulsion A-155	lb.	.13	.18
P-370	lb.	.125	/ .175
Resin V	lb.	.13	
Santomerse D	lb.	.43	/ .65
S	lb.	.12	/ .25
Setsit No. 5	lb.	.75	/ 1.00
SPDX-GL	lb.	.95	
Stablex A	lb.	.90	/ 1.10
B	lb.	.50	/ .95
G	lb.	.50	/ .70
L	lb.	.30	/ .40
Sulfur Dispersion, 50%	lb.	.07	/ .15
66%	lb.	.09	/ .17
73%	lb.	.10	/ .12
Tergitol wetting agents	lb.	.265	/ .37
Triton R-100	lb.	.145	/ .25
Zinc oxide, dispersed	lb.	.13	/ .20
Mold Lubricants			
Aluminum stearate	lb.	.38	/ .45
Aquarex D	lb.	.76	
L Paste	lb.	.85	
MDL Paste	lb.	.30	
Carbowax compounds	lbs.	.24	/ .35
Colite Concentrate	gal.	.90	/ 1.15
ELA	lb.	.80	
DC Mold Release	lb.	5.20	/ 6.00
Emulsion No. 35	lb	2.08	/ 3.50
DC 7	lb.	6.20	6.80
Glycerized Liquid Lubricant, concentrated	gal.	1.75	
Lubrex	lb.	.25	/ .30
Mica	lb.	.0675	/ .075
Mold Paste	lb.	.25	
Mont. n Wax	lb.	.57	
Para Lube	lb.	.046	/ .048
Sodium stearate	lb.	.19	/ .24
Talc	ton	14.00	/ 32.00
Vanfre	gal.	2.00	2.50
Odorants			
B-3223	lb.	2.50	
Coumarin	lb.	3.00	/ 3.15
Curodex 19	lb.	4.75	
188	lb.	5.75	
198	lb.	6.75	
G13-4440	lb.	3.50	
-5280, -5424, -53481	lb.	2.50	
-5296	lb.	1.25	
-5386	lb.	2.00	
Parador A	lb	2.25	
C	lb	3.25	
E	lb.	.55	
F	lb.	.47	
I	lb.	2.00	
K	lb.	.43	
Resador Nos. 1, 5	lb.	2.50	
No. 10	lb.	.40	
Rodo No. 6	lb.	4.00	/ 4.50
No. 10	lb.	5.00	/ 5.50
Vanillin	lb.	3.00	/ 4.05
Plasticizers and Softeners			
Akroflex C	lb.	.61	/ .63
Aro Lene #1980	lb.	.10	/ .12
Bardol 639	lb.	.0275	/ .045
Bondogen	lb.	.55	.60
BRC 20	lb.	.0125	.0145
B. R. H. No. 2	lb.	.022	.029
B. R. S. 700	lb.	.0175	.029
R. R. T. No. 4	lb.	.0225	.0235
B. R. V.	lb.	.0325	.040
Bunarax resins	lb.	.06	/ .120
Bunnatol G. S.	lb.	.40	.505
Butac	lb.	.105	.115
BxDC	lb.	.40	.41
Califlux 510,550	lb.	.025	.03
G. P.	lb.	.0125	.0225
R 100	lb.	.03	.050
Carbowax S Flakes	lb.	.0475	.0525
S Plastic	lb.	.046	.051
644	lb.	.0375	.044
Contogums	lb.	.0875	.111
Cumar RX	lb.	.0225	
MH	lb.	.065	.11
V	lb.	.0975	.1275
Dielex B	lb.	.06	
Dipentene, American	gal.	.35	
Sunny South	gal.	.35	
Dipolymer Oil	gal.	.33	.38
Dispersing Oil No. 10	lb.	.0525	.055
Duraplex C-50 LV, 100%	lb.	.25	.295
Dutrex 6	lb.	.025	.035
Emersol 110	lb.	.175	.185
120	lb.	.18	.19
130	lb.	.2025	.2125
210 Elaine	lb.	.14	.1625
Emery 600	lb.	.0925	.115
Flexol Plasticizer 3GH	lb.	.55	/ .60
3GO	lb.	.515	/ .60
4GO	lb.	.36	/ .38
8N8	lb.	.395	/ .465
DOP	lb.	.379	/ .424
R-1	lb.	.47	.475
TOF	lb.	.45	/ .52
TWS	lb.	0.405	/ 0.425

"DIAMONDS" are leak-proof!



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—are made in a complete range of sizes from 1" to 2½" roll connections for use on rubber mills, mixers or any other steam heated or water cooled roll. Patented construction prevents leaking. Specially compounded molded gasket lasts 14 months on average in severe service—easy, quick and inexpensive to replace—no tight packing to act as brake on roll.

SWING and BALL JOINTS...

—for use on rubber and plastic molding presses. Especially constructed to offset expansion and contraction caused by sudden change from high pressure steam to cold water. Permanently ends leaking nuisance. Ball joints recommended to correct misalignment in any hook-up.

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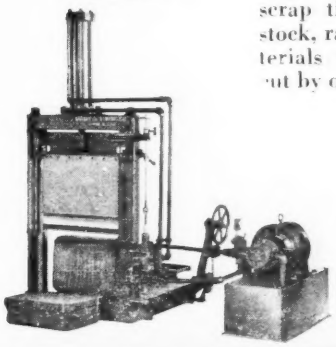

- Fast — efficient — self contained.
- No lubricants needed for cutting.
- Automatic blade return.
- Cutting cycle 9 seconds (Max. stroke).
- Knife opening 30" x 20".
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FOR RED RUBBER

....The utmost in pleasing appearance with no deteriorating effect whatever.

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RARE METAL PRODUCTS CO.
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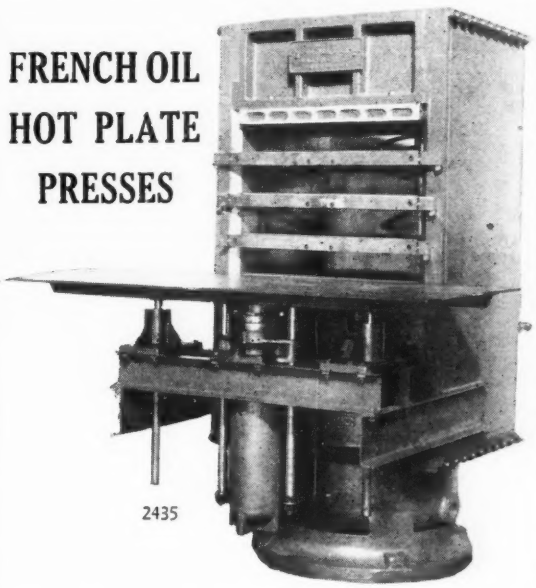
FRENCH OIL HOT PLATE PRESSES



2435

Side plate or column presses for compression or transfer or injection molding of rubber and allied synthetics.

Write for bulletins on "Modern Hydraulic Presses."

The FRENCH OIL MILL MACHINERY CO.
PIQUA, OHIO

Galex W-100	lb.	$0.135	/ $0.1725
W-100D	lb.	.1325	/ .17
G. B. Light Process Oil	lb.	.025	/ .0325
Heavy Resin Oil	lb.	.0225	/ .0325
Hercolyn	lb.	.1112	/ .1347
Hyfac 430	lb.	.18	/ .19
431	lb.	.195	/ .205
Indonex	gal.	.12	/ .17
IMH	lb.	.65	/ .68
Monoplex DBS	lb.	.58	/ .59
DOS	lb.	.57	/ .59
5	lb.	.70	/ .71
Nevillac oils	lb.	.33	/
Resins	lb.	.31	/ .45
Neville LX-685	lb.	.12	/
R Resins	lb.	.105	/ .155
Nevinol	lb.	.17	/
Nevoil	lb.	.0325	/ .0425
No. 1-D heavy oil	lb.	.055	/
Palmalene	lb.	.15	/
Para Flux, regular	gal.	.10	/ .2025
No. 2016	gal.	.165	/ .24
Heavy	gal.	.155	/
Para Resins	lb.	.04	/ .045
Paradene Resins	lb.	.065	/ .075
Para Lube	lb.	.046	/ .048
Paraplex AL-111	lb.	.33	/ .3375
G-25	lb.	.76	/ .77
-40	lb.	.43	/ .44
-50	lb.	.395	/ .405
Pepton 22	lb.	.72	/ .75
Picco-10, -25	lb.	.12	/ .17
-75, -100	lb.	.115	/ .17
480 Oilproof resin	lb.	.15	/ .20
S. O. S.	gal.	.29	/ .34
Piccocizer 30	lb.	.055	/ .06
Piccolastic Resins	lb.	.139	/ .275
Piccolyte Resins	lb.	.15	/ .2075
Piccoumaron Resin 427-R	lb.	.12	/ .17
Resins	lb.	.06	/ .17
Piccovars	lb.	.12	/ .125
Picrocel	lb.	.025	/ .04
Pictar	gal.	.25	/ .30
Pigmentar	gal.	.345	/ .435
Pigmentarol	gal.	.32	/ .41
Pine Oil, American	gal.	.45	/ .55
Sunny South	gal.	.45	/ .55
Plastender S	lb.	.0375	/ .04
Plasticizer 35	lb.	.205	/ .24
36	lb.	.305	/ .34
42	lb.	.34	/ .40
2175	lb.	.46	/ .56
3425	lb.	.605	/
3497	lb.	.61	/
3560	lb.	.56	/
B	lb.	.35	/ .45
SC	lb.	.50	/ .57
Plastoflex #3, SC	lb.	.50	/
#50	lb.	.38	/
FP-6	lb.	.52	/
Plastogen	lb.	.0775	/ .08
Plastolein	lb.	.52	/ .53
Plastone	lb.	.22	/ .30
PS-60 Resin	lb.	.35	/
PT67 Light Pine Oil	gal.	.60	/ .70
101 Pine Tar Oil	gal.	.32	/ .43
400 Light Pine Tar	gal.	.345	/ .455
600 Med. Pine Tar	gal.	.345	/ .455
800 Heavy Pine Tar	gal.	.345	/ .455
R-19, R-21 Resins	lb.	.1075	/
Reogen	lb.	.1175	/ .12
Resin C pitch	lb.	.02	/ .0285
R6-3	lb.	.38	/ .40
Resinex	lb.	.0325	/ .0375
L-4	lb.	.0225	/ .03
RPA No. 2	lb.	.65	/
No. 3	lbs.	.46	/
5	lb.	.57	/
RSN Flux	gal.	.10	/ .19
Rubberol Compound	lb.	.305	/
S-Polymers	lb.	.44	/
Santicizer B-16	lb.	.52	/ .57
E-15	lb.	.49	/ .54
M-17	lb.	.46	/ .51
No. 140	lb.	.3225	/ .38
Seedine	lb.	.1485	/ .1705
Solvenol	gal.	.56	/ .58
Staybelite Resin	lb.	.06	/ .065
Stearex Beads	lb.	.147s	/ .155s
Stearic acid, single pressed	lb.	.175	/ .185
Double pressed	lb.	.18	/ .19
Triple pressed	lb.	.2025	/ .2125
Stearite	lb.	.147s	/
Syn-Tac	gal.	.33	/ .35
Synthol	lb.	.245	/
"Thiokol" LP-3	lb.	.85	/
TP-90B	lb.	.65	/
-95	lb.	.55	/
-95	lb.	.50	/
TR-11	lb.	.035	/
Turgum S	lb.	.0875	/ .0975
Tyrosnite	lb.	.215	/ .2225
Vistac No. 1	gal.	1.21	/ 1.32
2	gal.	1.62	/ 1.66
4	gal.	1.76	/ 1.80
X-1 Resinous Oil	lb.	.0175	/ .0325
XX-100 Resin	lb.	.0525	/

Reclaiming Oils

Bardol 639	lb.	.0275	/ .045
B. R. H. No. 2	lb.	.02	/ .029
B. R. T. No. 4	lb.	.0225	/ .0285
B. R. V.	lb.	.0325	/ .044
BWH-1	lb.	.14	/
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0525	/ .055
G. B. Reclaiming Oil	gal.	.12	/ .18
Heavy Resin Oil	lb.	$0.0225	/ $0.0325
LX-77	gal.	.18	/ .30
-572	gal.	.23	/ .34
No. 1621	lb.	.025	/ .035
Picco C-10	gal.	.25	/ .30
C-28	gal.	.33	/ .38
C-33	gal.	.20	/ .25
C-42	gal.	.27	/ .32
D-4	gal.	.23	/ .28
E-5	gal.	.21	/ .26
Q-Oil	gal.	.246	/ .296
PT 101 Pine Tar Oil	gal.	.32	/ .43
150 Pine Solvent	gal.	.44	/ .55
Solvenol	gal.	.56	/ .58
S. R. O.	lb.	.015	/ .0225
Wilcor Nos. 111, 151	gal.	.26	/ .30
X-1 Resinous Oil	lb.	.0175	/ .0325
-60 Solvent	gal.	.24	/ .38

Reinforcers, Other Than Carbon Black

BRC 20	lb.	.0125	/ .0145
Bunarex resins	lb.	.06	/ .125
Calcene T	ton	45.00	/ 55.00
Calco S. A.	lb.	.75	
Carbonex S flakes	lb.	.0475	/ .0525
S Plastic	lb.	.046	/ .051
644	lb.	.0375	/ .04
Clays			
Aluminum Flake	ton	16.00	/ 22.00
No. 5	ton	20.00	
Buca	ton	40.000	
Catalpo	ton	30.00	
Dixie	ton	14.00	
Hydratex R	ton	30.00	
L. G. B.	ton	17.00	
Paragon (R)	ton	13.50	/ 31.50
Pigment No. 33	ton	30.00	
Suprex	ton	14.00	/ 32.00
Witco Nos. 1, 2	ton	25.00	
Clearearb	lb.	.1175	/ .1225
Cumar EX	lb.	.0525	
MH	lb.	.065	/ .1175
V	lb.	.0975	/ .1275
Darex Copolymer Nos. 3			
X 34	lb.	.35	/ .37
No. X 43	lb.	.36	/ .38
G Resin	lb.	.08	
Good-Rite Resin 50	lb.	.415	/ .455
Magnesia, Calcined			
Extra Light, U. S. P.	lb.	.34	
K&M	lb.	.31	
Light, technical	lb.	.28	
No. 101	lb.	.175	
Heavy, technical	lb.	.05	/ .1275
Medium light, technical	lb.	.12	
Magnesium carbonate	lb.	.09	/ .135
Marbon S, S-1	lb.	.36	/ .43
Millical	ton	27.50	
Multiflex MM	ton	105.00	
Special	ton	125.00	
Neville R Resins	lb.	.10	/ .155
Para Resins 2457, 2718	lb.	.04	/ .045
Picco-75, -100	lb.	.115	/ .17
Piccolastic Resins	lb.	.139	/ .275
Piccolyte Resins	lb.	.15	/ .2075
Piccoumaron Resins	lb.	.06	/ .17
Piccovars	lb.	.12	/ .125
Pliolite, Natural Rubber	lb.	.75	/ .82
Milled	lb.	.85	/ .92
S-2, Milled	lb.	.74	/ .81
S-3, -6	lb.	.36	/ .43
S-6 Masterbatches	lb.	.35	/ .50
PS-60 Resin	lb.	.35	
Resin C Pitch	lb.	.02	/ .0285
Resinex	lb.	.0325	/ .0375
S-Polymers	lb.	.44	
Silene EF	lb.	.055	/ .06
Super Multiflex	ton	124.00	
Witcarb R	ton	100.00	
R-12	ton	32.00	
Zinc oxide, commercial†	lb.	.155	/ .185

Retarders

Cumar RH	lb.	.105	
Delac J	lb.	.55	/ .60
E-S-E-N	lb.	.36	/ .41
Good-Rite Vultrol	lb.	.55	/ .57
R-17 Resin	lb.	.1075	
Retarder PD	lb.	.36	
W	lb.	.43	
Retardex	lb.	.51	/ .54
RM	lb.	1.25	
Thionex	lb.	1.25	
Vultrol	lb.	.50	/ .55

Solvents

Benzol, industrial	gal.	.20	/ .21
Bonded-gen	lb.	.55	/ .60
Carbon bisulfide	lb.	.0625	/ .095
Tetrachloride	lb.	.08	/ .11
Cosol	gal.	.30	/ .38
GVL	lb.	1.00	
Neyssol	gal.	.185	/ .25
Pico Hi-Solv Solvents	gal.	.21	/ .26
Skellysolve-B	gal.	.141	
C	gal.	.133	
R	gal.	.100	
Tollac	gal.	$0.195	/ $0.25
Toluol, industrial	gal.	.23	/ .29
2-50-W Hi-Flash Solvent	gal.	.37	
Xylol, industrial	gal.	.23	/ .28

Synthetic Resins

Geon Latices (dry wt.)	lb.	.465	/ .60
Paste Resins	lb.	.34	/ .60
Plastices	lb.	.365	/ .85
Polyblend	lb.	.43	/ .58
Polyvinol resins	lb.	.34	/ .58
Marvinol VR-10	lb.	.33	/ .50

Synthetic Rubbers and Latices

Butaprene NAA	lb.	.44	/ .465
NF	lb.	.39	/ .415
NL	lb.	.40	/ .425
NXM	lb.	.47	/ .495
Butaprene Latex (dry wt.)			
NI, NXM	lb.	.455	/ .49
Chemigum N-1	lb.	.53	/ .60
Chemigum Latex Type 101 (dry wt.)	lb.	.37	/ .40
Hycar OR-15, -15EP	lb.	.52	/ .53
OR-25, -25 EP	lb.	.45	/ .46
OR-25 NS	lb.	.47	/ .48
OS-10	lb.	.50	/ .51
Hycar Latex (dry wt.)			
1501, 1531, 1551	lb.	.49	/ .54
1502, 1552, 1562	lb.	.42	/ .47
1532	lb.	.435	/ .485
Neoprene Latex (dry wt.)			
Type 571, 842, 842-A	lb.	.29	/ .40
572, 700	lb.	.30	/ .41
601, 601-A	lb.	.32	/ .43
Neoprene Type AC, CG	lb.	.50	/ .53
E	lb.	.65	/ .68
FR, KNR	lb.	.75	/ .78
NC	lb.	.32	/ .35
Paracril 18-80	lb.	.43	/ .45
26NS60, 26NS60	lb.	.44	/ .46
35NS90	lb.	.51	/ .53
Paracril Latex Type II (55%)	lb.	.38	/ .42
Paraplex X-100	lb.	1.00	
Silastic	lb.	2.35	/ 4.05
"Thiokol" Latex (dry wt.)			
MF	lb.	.70	
MX	lb.	.50	
WD-2	lb.	.75	
"Thiokol" LP-2	lb.	.85	
PR-1	lb.	.75	
Type A	lb.	.37	
FA	lb.	.52	
ST	lb.	.75	

Tackifiers

Bunarex-10, 25, -40	lb.	.07	/ .125
Contogums	lb.	.0875	/ .11
Galex W-100	lb.	.135	/ .1725
W-100D	lb.	.1325	/ .17
Hercolyn	lb.	.1122	/ .1347
Indopol H300	lb.	1.21	/ 1.32
Natac	lb.	.10	/ .11
Nevindene	lb.	.125	/ .155
Picco-10, -25	lb.	.12	/ .17
Piccolastic Tackifiers	lb.	.139	/ .275
Piccolyte Resins	lb.	.15	/ .2075
Piccoumaron Resin 427-R	lb.	.12	/ .17
Resins	lb.	.06	/ .17
Staybelite Resin	lb.	.06	/ .065
Synthetic 100	lb.	.41	
Synthol	lb.	.245	
Vistac No. 1	gal.	1.32	
No. 2	gal.	1.66	
4	gal.	1.80	
Vistanex	lb.	.32	

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.65	
Ethyl Tuads	lb.	1.00	
G-M-F	lb.	2.50	
Litharge, commercial	lb.	.2225	/ .225
Eagle, sublimed	lb.	.2225	/ .2235
Magnesia, Calcined			
Carey	lb.	.28	
Extra-light, U.S.P.	lb.	.34	
Heavy, technical	lb.	.05	/ .31
K&M Neoprene Grade	lb.	.31	
Light, technical	lb.	.22	/ .28
No. 101	lb.	.175	
Medium-light, technical	lb.	.175	
Methyl Selenac	lb.	1.60	
Tuads	lb.	1.10	
Red Lead, commercial	lb.	.2325	/ .2475
Eagle	lb.	.2325	
Sulfur flour, commil.	100 lbs.	1.60	/ 2.30
Black Bird	lb.	.036	/ .041
Calcine	lb.	.0175	/ .051
Chloride	lb.	.0325	/ .0725
Crystex	lb.	.195	
Insoluble 60	lb.	.13	/ .135
Rubbermakers	100 lbs.	2.25	/ 2.95
Spider Brand	lb.	.023	/ .044
Stauffer	lb.	.0175	/ .0285
Telloy	lb.	2.00	
"Thiokol" CA-10	lb.	1.50	
Vandex	lb.	2.00	
Vultac Nos. 1, 2	lb.	.38	/ .45
No. 3	lb.	.42	/ .49
White lead silicate	lb.	.214	/ .25
Eagle	lb.	.214	/ .2475

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ESTABLISHED 1903

BAIRD RUBBER
AND TRADING COMPANY

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- Red Lead (95%: 97%: 98%)
- Sublimed Litharge
- Litharge
- Basic Carbonate of White Lead
- Sublimed White Lead
- Basic White Lead Silicate
- Sublimed Blue Lead
- Zinc Pigments

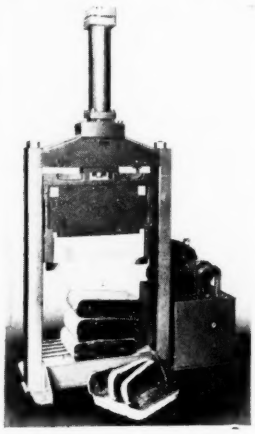
59 plants located in 27 states give Eagle-Picher's activities a national scope. Strategic location of plants and extensive production facilities enable Eagle-Picher to serve industry with increased efficiency... we manufacture a comprehensive line of both lead and zinc pigments for the rubber, paint and other process industries.

THE EAGLE-PICHER COMPANY

EAGLE Since EP 1843 PICHER

General Offices: Cincinnati (1), Ohio

CRUDE RUBBER BALE CUTTER



Complete Unit

Fully Assembled

Hydraulic Operation

High Production

An efficient machine of simple design for cutting bales of crude, synthetic and reclaimed rubber or similar materials. Cuts without aid of water or other lubricant. One man operation—safety control.

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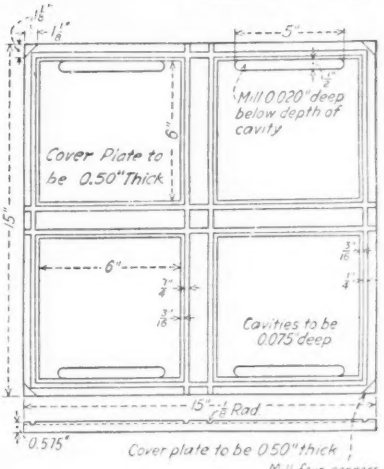
Since 1849

MOLDS & DIES FOR RUBBER TESTING

ONE OF THE MANY MOLDS AVAILABLE



Molds from 7" to 24" sq. for tension samples, and molds for compression samples if desired. Molds in dimensions varying from 1" x 1" x 1/4" up for abrasion test samples. Molds and dies for slab curing. Please describe your need.

HOGGSON & PETTIS MFG. CO.

141S Brewery St., New Haven 7, Conn.

Pac. Coast: H. M. Royal, Inc., Los Angeles

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Exports of Domestic Merchandise

	November, 1948	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Chicle	64,703	$29,339
Synthetic Rubber: GR-S:	226,260	58,369
Butyl	2,440	553
Neoprene	273,630	90,115
Nitrile	257,765	111,703
Polyisobutylene	5,490	1,701
Other, except Thiokol	13,322	5,078
Reclaimed rubber	2,710,384	220,913
Scrap rubber	1,787,586	74,792
TOTALS	5,341,690	$592,563
MANUFACTURED		
Rubber cement	40,381	$47,409
Fabric, tarred, waterproofed or tar sheeting, sq. yds.	75,553	47,389
Fire-fighting, chemical hose	51,274	13,446
Footwear: boots, pr.	6,643	31,087
Shoes, pr.	9,490	21,368
Rubber-soled canvas shoes, prs.	77,839	140,389
Soles, doz. prs.	18,817	61,334
Heels, doz. prs.	30,956	30,365
Rubber soling and sheeting, lbs.	74,808	18,109
Gloves and mittens, doz. prs.	6,514	22,151
Drug sundries, hot water bottles and fountain syringes, no.	11,267	7,238
Other		133,556
Rubber or rubberized clothing		57,820
Balloons		106,980
Toys and balls		36,334
Bathing caps, doz.	230	1,082
Rubber bands, lbs.	1,080	1,168
Erasers, lbs.	5,202	3,898
Hard rubber goods fabricated, no.	26,561	37,242
Other electrical goods, lbs.	100,003	55,857
Cycle tires and tubes, no.	4,311	6,309
Other		9,267
Tire casings, truck and bus, no.	56,026	2,536,490
Auto, no.	30,235	423,469
Inner tubes, auto, truck, bus, no.	54,530	203,027
Other casings and tubes, except air, no.	43,778	708,437
Solid tires, auto and truck, no.	2,164	55,867
Other, no.	37,919	20,100
Tire repair materials: camelback, lbs.	72,862	20,882
Other, lbs.	88,231	40,437
Rubber and rubberized fabric, lbs.	27,146	20,426
Belting, n.e.c., lbs.		
Belts, lbs.	38,950	46,437
Other, lbs.	327,766	361,640
Hose and tubular garden hose, lbs.	34,766	11,615
Other, lbs.	348,315	280,435
Rubber packing, lbs.	95,315	70,325
Mats, matting, tiling, lbs.	720,652	169,242
Thread, lbs.	12,945	18,812
Textile covered, lbs.	8,892	25,164
Gutta percha manufactures, lbs.	1,813	2,003
Latex and other compounded rubber for further manufacture, lbs.	325,544	81,403
Other rubber products		246,344
TOTALS		$6,260,889
GRAND TOTALS, ALL RUBBER EXPORTS		$6,853,452

Reexports of Foreign Merchandise

UNMANUFACTURED, Lbs.		
Crude rubber	1,730,129	$349,315
Balata	11,197	4,500
TOTALS	1,741,326	$353,815
MANUFACTURED		
Rubber gloves and mittens, doz. prs.	100	$6000
Drug sundries, except syringes and hot water bottles		3,965
Rubber or rubberized clothing		272
Other rubber products		966
TOTALS		$5,803
GRAND TOTALS, ALL RUBBER REEXPORTS		$359,618

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Imports for Consumption of Crude and Manufactured Rubber

	November, 1948	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	111,551,303	$22,292,055
Rubber latex	1,821,668	466,095
Balata	192,356	49,155
Jelutong or Pontianak	108,573	36,634
Gutta percha	15,215	10,572
Synthetic rubber	4,453,734	832,295
Chicle	882,039	615,347
Scrap rubber	1,155,221	18,878
TOTALS	120,210,109	$24,321,034
MANUFACTURED		
Tires: auto, bus, truck, no.	467	$3,868
Bicycle, no.	570	1,609
Inner tubes, no.	217	374
Rubber footwear:		
Boots, prs.	24,427	29,083
Shoes and overshoes, prs.	41,232	65,649
Rubber-soled canvas shoes, prs.	17,258	21,714
Balls, except golf and tennis, no.	97,650	11,506
Toys, except balloons		3,944
Hard rubber products:		
Combs, no.	216	49
Other sundries		293
Goods		711
Rubberized printing blankets, lbs.	210	443
Rubber gaskets and valve packing		230
Molded rubber insulators		4
Rubber belting, lbs.	3,772	4,980
Hose and tubing		117
Instruments, doz.	36	140
Drug sundries		1,658
Rubber bands, lbs.	4,638	2,076
Synthetic rubber products		135
Soft rubber goods, except drug sundries		9,423
TOTALS		$158,006
GRAND TOTALS, ALL RUBBER IMPORTS		$24,479,004

United States Rubber Statistics—November, 1948

All Figures in Long Tons, Dry Weight

	New Supply			Distribution		Month-End Stocks
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	*49,857	49,857	49,150	†746	103,600
Latex, total	0	814	814	2,482	0	9,651
Rubber and latex, total	0	50,671	50,671	51,632	746	113,251
Synthetic rubber, total	§38,708	1,988	42,767	37,690	366	107,310
	• 2,011					
GR-S	§30,709	1,208	32,361	29,145	101	90,409
	• 444					
Butyl	§ 5,552	780	6,332	5,050	1	9,102
Neoprene	§ 2,507	0	3,073	2,999	**149	5,294
	• 566					
Nitrile	• 1,000	0	1,001	496	115	2,505
Natural rubber and latex, and synthetic rubber, total	40,779	52,659	93,438	89,322	1,112	220,561
Reclaimed rubber, total	23,050	0	23,050	22,170	1,210	33,378
GRAND TOTALS	63,829	52,659	116,488	111,492	2,322	253,939

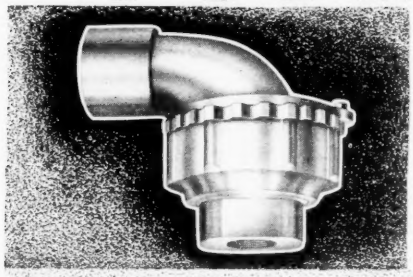
*Includes adjustments of +55 tons applicable to April and +2 tons applicable to August.
†Includes adjustment of −26 tons applicable to August.
‡Includes adjustment of +1 ton applicable to July.
§Government plant production.
• Private plant production.
Includes 18 tons shipped for export, but not cleared.
**Includes adjustment of +27 tons applicable to August.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, Dec., Nov., 1948, Total Years, 1948-1947

	1948				
	December	% Change from Preceding Month	November	Totals	Totals, 1947
Passenger Casings					
Shipments					
Original equipment	1,897,127		1,946,041	21,582,372	19,644,143
Replacement	2,351,383		2,506,140	41,275,088	32,857,228
Export	71,685		50,519	659,082	1,608,082
Total	4,320,195	− 4.05	4,502,700	63,516,542	74,109,453
Production	4,609,669	− 7.44	4,980,269	66,780,127	77,795,299
Inventory end of month	8,788,907	− 3.21	8,515,885	8,788,907	5,444,071
Truck and Bus Casings					
Shipments					
Original equipment	402,033		389,259	5,257,788	5,411,521
Replacement	601,330		632,402	7,851,156	10,013,994
Export	118,968		67,424	1,149,196	1,648,396
Total	1,122,331	− 3.05	1,089,085	14,258,140	17,073,911
Production	1,105,386	− 1.15	1,118,181	14,588,007	17,754,837
Inventory end of month	1,933,166	− 1.38	1,960,266	1,933,166	1,505,221
Total Automotive Casings					
Shipments					
Original equipment	2,299,160		2,335,300	26,840,160	25,055,664
Replacement	2,952,713		3,138,542	49,126,244	62,871,222
Export	190,653		117,943	1,808,278	3,256,478
Total	5,443,526	− 2.67	5,591,785	77,774,682	91,183,364
Production	5,715,055	− 6.29	6,098,450	81,368,134	95,550,136
Inventory end of month	10,722,073	− 2.35	10,476,151	10,722,073	6,949,292
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,289,898		2,343,900	26,838,561	25,045,559
Replacement	2,308,231		2,693,681	40,493,729	46,559,918
Export	124,235		85,856	1,125,107	2,482,665
Total	4,722,364	− 7.83	5,123,437	68,457,397	74,088,142
Production	5,033,856	− 7.86	5,463,453	70,149,819	79,180,571
Inventory end of month	9,734,490	− 4.64	9,303,066	9,734,490	8,059,315

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc.

FLEXO JOINTS



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Wherever a flexible or swing joint is required

Designed to carry pressures *better* wherever a swing joint is needed. Flexo Joints offer full 360° movement — with no restriction of flow in any position. Consisting of four simple parts: no springs, no small parts, no ground surfaces to wear, they assure long service, unusually low maintenance cost.

Flexo Joints are available in four styles for all standard pipe sizes from 1¼" to 3".

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PLANTATION ★ WILD ★ BALATAS ★ GUMS ★ GUAYULE

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Sheet & Rod Packings
for every condition

Mechanical Specialties of Every Description

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Factory & Main Office
TRENTON 5, N. J.

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BAYTOWN, TEXAS • BARNESVILLE, GA. • PASADENA, CAL.

Associated Factories:

CANADA • MEXICO • VENEZUELA • CHILE • PORTUGAL

Malayan Rubber Statistics

The following statistics for December, 1948, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe			Latex, Concentrated Latex, and Revertex (Dry Rubber Content)		
	Malayan Union			Malayan Union		
	Singapore Export Proper	Trans-shipped	Direct Shipments	Singapore Export Proper	Trans-shipped	Direct Shipments
Australia	1,711	29	448	17	28	...
Belgium	169	60	141	...	1	...
Bulgaria	150	...	...	...	...	...
Burma	...	...	700	...	...	...
Canada	1,492	296	1,416	...	...	...
Chile	84	5	...	...	...	...
China	1,314	...	80	...	...	...
Czechoslovakia	60	...	50	...	...	...
Denmark	298	75	243	3	...	...
Egypt	10	...	...	...	...	...
Finland	...	...	427	...	...	...
France	1,823	394	1,295	162	49	...
Germany	1,162	223	3,316	...	...	...
Hong Kong	544	...	326	...	...	...
Italy	1,209	459	916	...	129	...
Japan	2,095	2	709	...	...	...
Mexico	280	...	360	3	2	...
Netherlands	1,505	65	586	7	...	7
New Zealand	10	...	...	...	...	...
Norway	200	35	161	...	6	...
Other countries in South America	118	...	29	...	...	...
Philippine Islands	...	...	...	1	...	...
Poland	206	64	230	...	...	...
Portugal	11	...	...	...	...	...
Rumania	...	...	122	...	...	...
Russia	4,023	...	1,303	...	...	...
Siam	1	...	...	...	...	...
Sweden	1,500	685	417	16	...	...
Switzerland	55	...	...	...	...	...
Syria	13	...	...	...	...	...
Turkey	...	25	130	...	...	...
Union of India	330	20	...	...	...	...
Union of South Africa	70	...	...	...	...	...
United Kingdom	3,774	1,155	1,834	347	20	19
U. S. A.	10,059	1,269	9,363	225	...	787
Total	34,276	4,861	24,600	781	235	813

Foreign Imports of Rubber in Long Tons

	Dry Rubber	Wet Rubber (Dry Weight)
Singapore Imports from		
Banka and Billiton	199	...
Brunei	80	1
Dutch Borneo	734	1,523
Java	67	3
North Borneo	1,100	52
Other countries in Asia	26	2
Dutch Islands	24	1
Rhio Residency	419	26
Sarawak	2,142	48
Sumatra	4,284	8,504
Total	9,075	10,160
Federation of Malayan Imports from		
Burma	754	32
Siam	2,989	
Sumatra	1,415	616
Total	5,158	648

Dealers' Stocks

	Tons
Penang and Province Wellesley	11,893
Singapore	45,143
Total	67,036

Port Stocks in Private Lighters and Railway Godowns

Penang and Province Wellesley	10,222
Port Swettenham	1,550
Singapore	12,475
Teluk Anson	528
Total	24,775

Production

Estates	38,177
Small holdings (estimated)*	19,809
Total	57,986

*The production on small-holdings (estates of less than 100 acres) is estimated from the formula: production + imports + stocks at beginning of month = exports + stocks at end of month + consumption.

OBITUARY

Kirk Brown

ONE of the organizers of the Bakelite Corp., a unit of Union Carbide & Carbon Corp., New York, N. Y., Kirk Brown, died February 4 at his winter home in Bradenton, Fla. The 86-year-old executive had been retired for about 25 years.

A native of Philadelphia, Mr. Brown attended local public schools.

He was one of the first men to use pneumatic tires in this country when he founded the Dunlop Tire Co. of America at Belleville, N. J. Shortly before World War I he also organized the Condensite Co. of America at Glen Ridge, N. J., which in 1922 became a part of Bakelite Corp. and of which Mr. Brown became vice president and general manager. He also had several patents to his credit.

His other activities included being the first president of the Automobile Club of New Jersey, helping form the Century Wheelmen Club, being a member of the New Jersey Taxpayers Association, a founder of the Tax League of Montclair, one of the original members of the New Jersey Constitution Foundation, and a member of the Montclair Golf and Dunworkin clubs.

Funeral services were held February 19 at the Home for Services, Montclair, N. J., followed by private burial at Mt. Hebron Cemetery.

Surviving the deceased are his three sons and a sister.

Philip Lieberman

Philip Lieberman

ONE of Spain's worst train wrecks claimed the life of Philip Lieberman, who handled export sales for H. Muehlstein & Co., Inc., New York, N. Y. He was on a business trip when he met his untimely death on February 12.

He became associated with Muehlstein in 1918 and advanced through the various divisions and branches of the company until attaining his last position. He also belonged to the I. O. O. F.

The deceased was born in New York, N. Y., in 1902.

Funeral services were held February 22 in the Riverside funeral chapel, New York.

Surviving Mr. Lieberman are his wife, three daughters, his father, a sister, and a brother.

Trade Lists Available

The Commercial Intelligence Branch, United States Department of Commerce, Washington, D. C., recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from this Branch and from Department of Commerce field offices at $1 a list for each country.

Corset, Brassiere, Garter, Suspender, and Girdle Manufacturers and Exporters—Australia; Cuba; Mexico; Turkey.

Dental Supply Houses—Austria; Luxembourg; Mexico; Philippines; United Kingdom; Venezuela.

Electrical Supply and Equipment Importers and Dealers—Costa Rica; France; Iran; Mexico; Norway; Turkey.

Gum Exporters—British Malaya.

Industrial Rubber Goods Importers, Dealers & Agents—Union of South Africa.

Office Supply & Equipment Importers & Dealers—Denmark; Dominican Republic; France; Guatemala; Honduras; Peru.

Plastic Material Manufacturers—Austria.

Plastic Material Manufacturers & Molders, Laminators & Fabricators of Plastic Products—Ireland.

Rubber Goods Manufacturers—France; Mexico.

Rubber Goods, Mechanical, Importers & Dealers—France.

Rubber Stamp & Stencil (Mimeograph) Manufacturers—Belgium; Ireland.

Rubber Stamps Manufacturers—Greece.

Sporting Goods, Toy & Game Importers & Dealers—Belgium; Burma; France; Germany.

Telephone & Telegraph Apparatus & Equipment Manufacturers—Belgium.

Toy & Game Importers & Dealers—Austria.

Toy & Game Manufacturers—Ireland.

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SITUATIONS OPEN RATES
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Bold face type $1.40 per line (eight words)
Letter replies forwarded without charge, but no packages or samples.

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS OPEN

RUBBER CHEMIST WANTED

Excellent opportunity in long-established, rapidly expanding, northeastern sole and heel plant for a graduate rubber chemist — experienced in compounding research and establishing process quality control. The man we want will be in his thirties, now working in a well-developed rubber research and control laboratory and ambitious for more rapid advancement. Please give full details of work performed, positions held, education, and salary expected. Replies held in complete confidence.

Address Box No. 310, Care of INDIA RUBBER WORLD.

RUBBER CHEMIST—MUST BE FULLY VERSED IN THE PROBlems of compounding natural and synthetic rubber, for plant in western Pennsylvania making a specialty of made-to-order molded goods, wrapped goods and roll coverings, and factory control of stocks through production. State full qualifications, references, wages required, etc., in your reply. Address Box No. 297, care of INDIA RUBBER WORLD.

GRINDING WHEEL RESINS. RELIABLE MANUFACTURER will make salary or commission arrangement if preferred on a permanent basis with Resin man experienced in selling to the Grinding Wheel Trade. Our present representatives have been notified about this advertisement. Address Box No. 298, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—EXCELLENT OPPORTUNITY FOR MAN with good educational background and some practical experience. Control and development work on sponge rubber and adhesives. Midwest location. Salary commensurate with ability. Address Box No. 299, care of INDIA RUBBER WORLD.

WANTED: EXCLUSIVE REPRESENTATIVE FOR NEW YORK territory by a well-established Midwest manufacturer of custom molded rubber goods produced by INJECTION molding, which results in merchandise that has never been equalled in tolerances and clean precision parts without any flash or trim; also molding of standard grommets, bumpers, gaskets, and other stock items for automotive, plumbing, and industrial trades. Manufacturers of custom and stock gaskets made from various types of gasket materials especially for the automotive and industrial machinery manufacturers. Must be experienced in rubber, as well as capable and aggressive, with a good earning record. Exceptional opportunity for a high-grade producer. Guaranteed salary and commission. State qualifications, experience, and references. Personal interview in New York. All applications will be kept confidential. Address Box No. 316, care of INDIA RUBBER WORLD.

TIRE COMPOUNDER

Excellent opportunity with progressive organization for man with eight to twelve years' experience in tire compounding. Location Midwest. State age, experience, and salary desired. Replies strictly confidential. Address goods, laboratory development synthetic latex. Age 54. Address Box No. Box No. 318, care of INDIA RUBBER WORLD.

SITUATIONS WANTED

WIRE MILL MANAGEMENT. TWENTY YEARS' EXPERIENCE large and small mills. Rubber and plastic extrusion, Bare, Weatherproof, Varnished Cambric, Asbestos Covered wires and cables. Cord sets. Record of achievement—reduction of costs through Production and Material Control, Plant Layout and Methods, Time and Motion Study, Job Evaluation and Merit Rating. Available on short notice. Address Box No. 302, care of INDIA RUBBER WORLD.

SITUATIONS WANTED (Continued)

SUPERINTENDENT-CHEMIST WITH 20 YEARS' EXPERIENCE in mechanical rubber specialties, extruded and press goods, calender coating—both rubber and plastic. Address Box No. 300, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEER PRODUCTION FOREMAN PROVES: Your spreader department may earn higher profits if worked by expert who specialized in adhesive tapes on sheeting, paper, rubberized and lacquered goods. Worked with leading concerns. Address Box No. 301, care of INDIA RUBBER WORLD.

CHEMIST-SUPERINTENDENT, LATEX EXTRUDED THREAD and latex sheet production, desires change. Ten years' experience also includes laboratory development, product control latex dipped goods, spread goods, laboratory development synthetic latex. Age 34. Address Box No. 303, care of INDIA RUBBER WORLD.

RUBBER COMPOUNDER—6½ YEARS' EXPERIENCE IN HOSE, belt and molded goods compounding, including 3½ years in supervisory capacities. Desires position with future with progressive manufacturer. Graduate chemist, B.S., 1942, married. Address Box No. 304, care of INDIA RUBBER WORLD.

LOS ANGELES RESIDENT SEEKS NEW CONNECTION IN A supervisory capacity with reliable concern in or near Los Angeles. Familiar with practical compounding, processing, handling personnel. Know wires and cables, sponge, molded mechanicals. Address Box No. 305, care of INDIA RUBBER WORLD.

TECHNICAL SALES. YOUNG MAN AGE 30, M.S. CHEMISTRY, 1947, with 7½ years' experience in development and technical service for a national rubber manufacturer would like to change position for one in technical sales capacity. Familiar with equipment, compounding, and processing techniques of the rubber industry. Address Box No. 311, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEER—SUPERINTENDENT—WITH 20 YEARS' broad experience covering the laboratories, compounding, factory processing and engineering, and Production Management—Tire, Mechanicals, Tile, Automotive Parts. Address Box No. 312, care of INDIA RUBBER WORLD.

PRODUCTION SUPERVISOR, 15 YEARS' EXPERIENCE IN MILL room and press room, manufacturing mainly housewares, gas and sponge balls, mechanical goods. Age 39, married. Desire permanent position with a future. Address Box No. 313, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEER, OVER 15 YEARS' EXPERIENCE IN laboratory and production of molded mechanicals, inner tubes, soles and heels, and sponge rubber. Wish position as chemist and trouble shooter. Address Box No. 314, care of INDIA RUBBER WORLD.

TECHNICAL SERVICE OR SALES POSITION (NEW ENGLAND) desired by CHEMIST with 20 years' experience in sales, compounding, production, and development of plastic and rubber goods. Address Box No. 315, care of INDIA RUBBER WORLD.

ARE YOUR CUSTOMERS BECOMING MORE PARTICULAR? Possibly they are not getting the most out of your product. Young man with advanced degree and wide experience in compounding and processing rubber products is interested in a position with rubber supplier or manufacturer in a technical sales capacity. Address Box No. 317, care of INDIA RUBBER WORLD.

PLANT MANAGER & CHEMIST WITH 25 YEARS' EXPERIENCE in rubber and plastic chemical compounding and in the production of calendering and spreading materials and many products of the industry. Address Box No. 320, care of INDIA RUBBER WORLD.

PLANT SUPERINTENDENT DESIRES CONNECTION WITH small progressive organization in New York area. Can efficiently handle help and have over 20 years' experience in development work, compounding, processing, and finishing hard and soft rubber mechanical goods and specialties together with sponge rubber. Can estimate costs and have numerous trade contacts. Address Box No. 321, care of INDIA RUBBER WORLD.

BROCKTON TOOL COMPANY
Central Street
QUALITY MOULDS FOR ALL PURPOSES
South Easton, Mass.
THE FIRST STEP—A QUALITY MOULD

(Classified Advertisements Continued on Page 795)

New Goods and Specialties

Coated Mittens

ESKIMITTS, a new neoprene coated mitten for children's wintertime play, has been announced by Pioneer Rubber Co., Willard, O. Made of two separate linings of fleece and coated with durable red neoprene, Eskimitts are said to be wetproof and long lasting. A snug-fitting knit wrist keeps snow from sifting down inside the mittens. The new mittens, it is also claimed, will keep children's hands warm and dry while they are playing in the snow and will eliminate the discomfort of wet, chapped, or frozen hands.

Pioneer's Eskimitts for Children

Plastic Accordions

THREE new accordion models, featuring an all-plastic injection molded polystyrene reed and Marvalon plastic-coated bellows, are being made by Magnus Harmonica Corp., Newark, N. J. The Magnus Super Accordion Model A-1020 has 10 quick-acting, ivory-like buttons which regulate the tone of 20 plastic reeds, accurately tuned in the key of C and sufficient to play a wide range of musical selections. Produced in a variety of colors, this model comes complete with hand and thumb straps and is individually boxed with instruction booklet and song folio. The instrument is four by 4¼ by 8½ inches in size when closed, and extends to 14 inches when the bellows are opened.

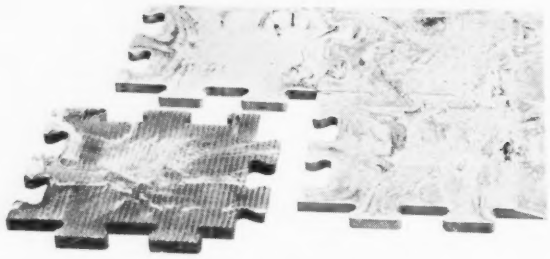
Magnus All-Plastic Super Accordion Model A-1020

The second accordion, the Magnus Junior Accordion Model A-612, is smaller in size and embodies 12 reeds, enough for many selections. This model is 2¾ by 3½ by five inches in size, when closed, and extends to eight inches and also comes individually boxed with instruction booklet and song folio. The third model, especially designed for the juvenile, is the Magnus Model 14 Playcordion which also has the plastic reed, but without selective keys. Produced in a variety of colors, the Playcordion is 2¼ by 2½ by five inches closed and extends to 5½ inches with the bellows open.

Interlocking Rubber Tiles

RUBBERLOCK, a unique type of rubber tile flooring with interlocking features, is being manufactured by R. I. Mitchell Rubber Co., Los Angeles, Calif. Because of its interlocking feature, the flooring requires no cement or mastic for installation and is therefore especially practical for fresh plane or graded concrete floors where other types of rubber tiling encounter adhesive problems. Available in either smooth or corrugated finish and in various colors, Rubberlock makes an attractive, durable floor with sound-deadening and resilient qualities, which is suitable for offices, factories, hospitals, shops, homes, and restaurants.

Rubberlock is approximately ¼-inch thick, and each tile is approximately eight inches square. It can run from wall to wall, or can be assembled with a beveled border that gives a dustproof, tripiree edge. The flooring requires no special skill in laying, being as simple as laying out a pattern of children's blocks, and much of it is sold on a "lay it yourself" plan. The flooring may be readily assembled to fit any size or shape area and is easily cut to conform to curved spaces. An important feature is its smooth interlocking fit at joints where aisles or runways cross, with no wrinkling or disassembly to provide accident hazards. Damaged sections can be removed and replaced with new tiles at any time.



Rubberlock Interlocking Floor Tiles

Plasti-Pet Vinyl Plastic Animals: *(Left to Right)* Horse, Cat, Dog, Squirrel, and Rabbit

Plastic Toys

PLASTI-PETS, a new series of inflated vinyl plastic toys packed in a sanitary cellophane display bag, is being marketed by Electronic Wave Products, Inc., New York 10, N. Y. Consisting of five plastic animals, the toys are permanently inflated and have no valves, can be readily washed or cleaned with a damp cloth, and are gaily decorated with fast colors, the manufacturer states. Colorless, translucent film is used for the series, which consists of a dog, a rabbit, a horse, a squirrel, and a cat. Features of the animals are set off in colors with contrasting trims; thus the dog is blue with a white trim, the rabbit white with green trim, the horse yellow with red trim, the squirrel yellow with maroon trim, and the cat red with green trim.

Tilting-Head Press

(Continued from page 766)

The small platen press has a maximum pressure stress of 3,000 p.s.i. and the large press is stressed for a 2,500 p.s.i. pressure. Pullback operation is accomplished by a telescopic ram located inside the main ram. The daylight opening on both presses is made to specification. Normal stroke is six inches in the smaller press and eight inches in the larger press. The presses can be furnished complete with self-contained Merit hydraulic power units, and special models are available equipped with integrally mounted Merit automatic processing control units which provide for simple push-button operation.

OUR NEW MACHINERY
HYDRAULIC PRESSES
CUTTERS—LAB. MILLS
BRAKES—LIFT TABLES
MILLS—MIXERS
SUSAN GRINDERS

NEW MACHINERY REBUILT

OUR 5-POINT REBUILDING PROCESS
1—INSPECTION
2—DISASSEMBLY
3—REBUILDING
4—MODERNIZING
5—GUARANTEE

L. ALBERT & SON
COAST-TO-COAST
TRENTON, N. J.—MAIN OFFICE

CLASSIFIED ADVERTISEMENTS

Continued

SITUATIONS WANTED (Continued)

RUBBER CHEMIST DESIRES TECHNICAL SERVICE POSITION with supplier. Five years' experience in rubber industry involving raw materials control and factory processing. One and one-half years' quality control with rubber chemical manufacturer. Thorough pigment background. Address Box No. 322, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: 1—WATSON STILLMAN LOW AND HIGH HYDRO Pneumatic Accumulator (3000± pressure with pumps, motors, and accessories. 1—48 x 48" 3-opening Hydraulic Press with 4-16" rams; other presses, various sizes. 1—5' x 24' Vulcanizer, 100± pressure, quick-opening door. 6—Royle and other Tubers 2½ to 8". Also mills, calenders, etc. Send us your inquiries. CONSOLIDATED PRODUCTS CO., INC., 13-16 PARK ROW, NEW YORK 7, NEW YORK. Telephone: BArclay 7-0600.

FOR SALE: FARREL 15" X 36", 2-ROLL RUBBER MILL. ALSO lab. 6" x 12", 30" 36", 40", 42", 60", 84" sizes; Rubber Calenders 30", 54" & 60"; Royle ±2 Perfected Extruder, other sizes 2" to 6"; Baker Perkins 200 gal. & 100 gal. double-arm, jack. Mixers, also 50, 20, 9 and Lab. 0.7 gals.; Large stock Hydraulic Presses from 12" x 12" to 42" x 48" platens, from 50 to 1,500 tons; Hydraulic Pumps & Accumulators; HPM 4-oz. Injection Molding Machine, other sizes 1 to 16 oz.; Stokes & Colton single punch & rotary preform Tablet Machines, ¼" to 2½"; Banbury Mixers; Rotary Cutters; Grinders & Crushers, Mixers; Pumps; Kettles; Tanks; etc. SEND FOR SPECIAL BULLETIN.
WE BUY YOUR SURPLUS MACHINERY
STEIN EQUIPMENT COMPANY
90 WEST STREET, NEW YORK 6, N. Y.

FOR SALE: 24" RUBBER MILL, $850. CAN BE SEEN IN OPERATION. RUBBA, INC., 1015 E. 173rd Street, Bronx, New York.

FOR SALE: COMPLETE EQUIPMENT FOR THE MANUFACturing of canvas footwear including lasts, engraved rolls, vulcanizers, die presses, molds, etc. Equipment in excellent condition and is available immediately. Priced reasonably. Address Box No. 307, care of INDIA RUBBER WORLD.

HOWE MACHINERY CO., INC.
30 GREGORY AVENUE PASSAIC, N. J.
Designers and Builders of
"V" BELT MANUFACTURING EQUIPMENT
Cord Lateying, Expanding Mandrels, Automatic Cutting, Skiving, Flipping and Roll Drive Wrapping Machines.
ENGINEERING FACILITIES FOR SPECIAL EQUIPMENT
Call or write.

An International Standard of Measurement for
Hardness • Elasticity
Plasticity of Rubber, etc.
Is the DUROMETER and ELASTOMETER (35TH YEAR)
These are all factors vital in the selection of raw material and the control of your processes to attain the required modern Standards of Quality in the Finished Product. Universally adopted.
It is economic extravagance to be without these instruments. Used free handed in any position or on Bench Stands, convenient, instant registrations, fool proof.
Ask for our Decriptive Bulletins R4, R5, and R6.
THE SHORE INSTRUMENT & MFG. CO.
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Agents in all foreign countries.

Economical NEW Efficient
Mills - Spreaders - Churns
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Calenders
...GUARANTEED...
Rebuilt Machinery for Rubber and Plastics
LAWRENCE N. BARRY
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SPECIALIZING IN
USED MACHINERY FOR THE RUBBER
AND ALLIED INDUSTRIES
MILLS, CALENDERS, HYDRAULIC PRESSES.
TUBERS, VULCANIZERS, MIXERS, ETC.
ERIC BONWITT 431 So. Dearborn St., Chicago 5, Ill.

GUARANTEED REBUILT MACHINERY
IMMEDIATE DELIVERIES FROM STOCK
MILLS, CALENDERS, TUBERS
VULCANIZERS, ACCUMULATORS
UNITED
HYD. PRESSES, PUMPS, MIXERS
CUTTING MACHINES, PULVERIZERS
UNITED RUBBER MACHINERY EXCHANGE
NEW ADDRESS: 183-189 ORATON ST. CABLE "URME" NEWARK 4, N. J.

(Classified Advertisements Continued on Page 796)

RUBBER MACHINERY
IS OUR BUSINESS

- Mills
- Calenders
- Presses
- Pumps
- Banburys
- Tubers
- Vulcanizers
- Grinders

Immediate Delivery — Good Equipment

Reasonable Prices—Each Installation Engineered

AKRON RUBBER MACHINERY CO.

P. O. Box 88 WA-0131 Akron, Ohio

LIQUIDATING Machinery
of Coated Fabrics Division of

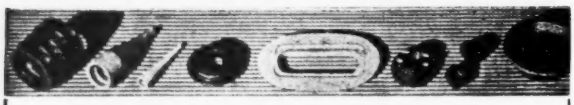
ATLAS POWDER CO., STAMFORD, CONN.

Including: — 24x66" 3-roll Calender, herringbone geared throughout with Variable Speed Motor and controls; 1 — 6" x 12" Laboratory Mill and Calender, combination unit; Several mills, 40" to 60". Royle 3 Strainer with drives and motors; Baker Perkins 100 gallon jacketed heavy duty double arm Mixer with 40 HP Motor; Sheridan Hydraulic Embossing Press, 26 x 54", Model 9AH; 15 — Coating and Spreading Machines, 60" to 70" width, 30 to 90' long. Representative on premises. Send for complete list.

CONSOLIDATED PRODUCTS CO., INC.

P. O. BOX 1115 STAMFORD, CONNECTICUT

TELEPHONE — STAMFORD 3-2171



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BLOWN — SOLID — SPONGE

FROM NATURAL, RECLAIMED, AND SYNTHETIC RUBBER

THE BARR RUBBER PRODUCTS CO. SANDUSKY OHIO

GRANULATED CORK
FOR EXTENDING RUBBER

SOUTHLAND CORK COMPANY

P. O. BOX 868 NORFOLK, VA.

NEW AND BETTER
GAMMETER'S
ALL STEEL ALL WELDED
CALENDER STOCK SHELL

4", 5", 6", 8", 10", 12" diameters, any length.
Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

CLASSIFIED ADVERTISEMENTS
Continued

MACHINERY & SUPPLIES FOR SALE (Cont'd)

FOR SALE: COMPLETELY REBUILT 2½ BANBURY MIXER bodies, spray or jacketed, to exchange for worn bodies and save you time. Also available, spare parts for Banbury bodies, quick service. INTERSTATE WELDING SERVICE, 914 Miami Street, Akron 11, Ohio.

RECONDITIONED F. J. STOKES MACH. CO. RD-4 ROTARY 16 punch preform presses, 10-ton pressure; Baker Perkins 15 gal. Vacuum Mixer double-arm, tkd.; W & P 300 gal. double-arm tkd. mixer. PERRY EQUIPMENT CORP., 1524 W. Thompson St., Phila. 21, Pa.

MACHINERY & SUPPLIES WANTED

WANTED AT ONCE: TWO 2-ROLL 60" MILLS SUITABLE for plastics. Contact CHARLES S. FIELDS, INC., 152 West 42nd Street, New York City.

WANTED: MEDIUM SIZED RUBBER MIXING MILL UNIT. Preferably complete with drive, motor, etc. Give complete description and location. Address Box No. 308, care of INDIA RUBBER WORLD.

WANTED: PRODUCTION MOLDS ON RUBBER TOYS FOR ANIMALS and children. Write c/o Box 50, Ozone Park, New York.

WANTED: PLASTIC VINYL SCRAP, BLACK, ALL GAGES, clear and clear transparent in all colors. Top prices paid. Large quantities, carload lots. Address Box No. 309, care of INDIA RUBBER WORLD.

WANTED: TWO (2) 2-ROLL CALENDERS 16" TO 18" X 48". Advise complete information and prices. C. H. Strauss, DETROIT GASKET & MFG. CO., Detroit, Mich.

WANTED AT ONCE: 1—6" X 16" CALENDER, 1—4" EXTRUDER, 4 or 5 40" to 60" mills, with or without drives. Address Box No. 325, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

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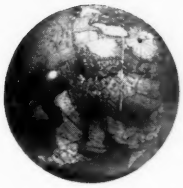

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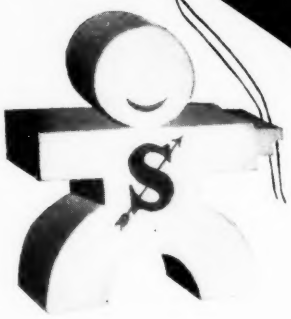

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